Chemical Age

VOL. 82 No. 2105

14 November 1959

THE WEEKLY NEWSPAPER OF THE CHEMICAL INDUSTRY

FISONS BECOME A HOLDING COMPANY

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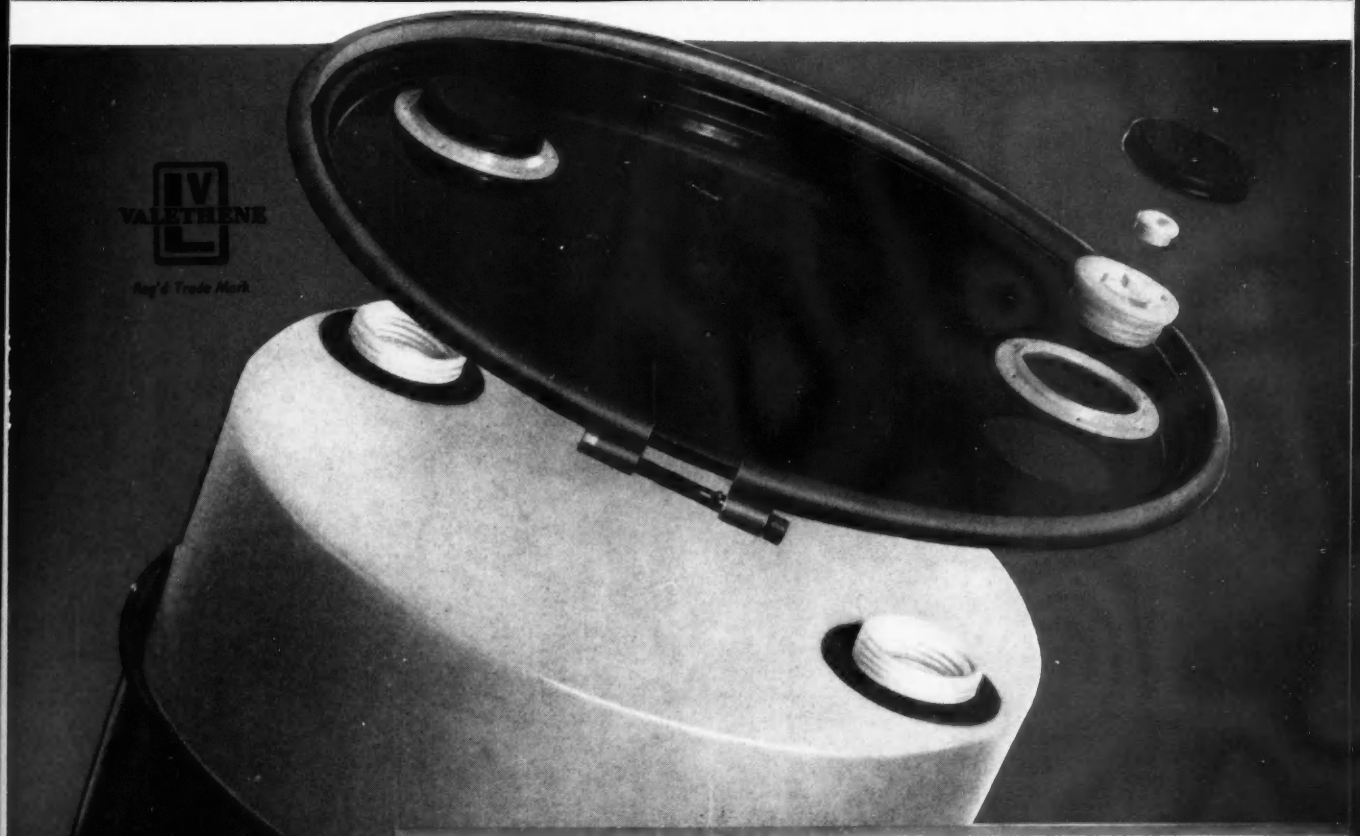

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MLW 129

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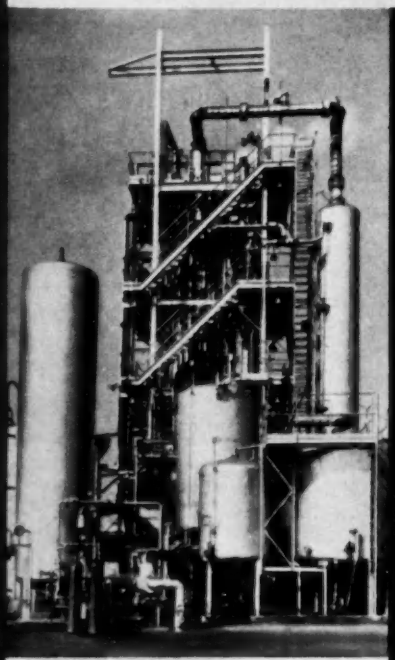
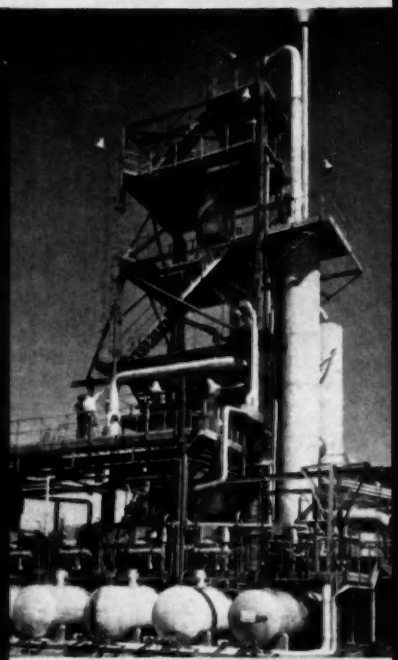


Revamped maleic anhydride plant for Reichhold Chemicals, Inc., Elizabeth, New Jersey.



SD-designed maleic anhydride plant for Cie. Francaise des Matieres Colorantes, France.

Request SD "Case Histories" Brochure giving technical and economic information on maleic anhydride.

Scientific Design's process skill applied to the hitherto difficult technological problems of maleic anhydride production resulted in a special patented catalyst, a radically new reaction system, and an efficient recovery process. Clients profit by substantially increased yield—longer catalyst life—exceptionally high product purity, all incorporated in smoothly operating plants without startup problems. SD is the recognized leader in maleic anhydride technology.

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* PROCESS SKILL

is the application of *expert chemical ability*—over and above routine engineering—to chemical plant design, construction and operation. SD's PROCESS SKILL has been gained through world-wide achievements in design and process development. This creative PROCESS SKILL is *built-in*—it is regularly a part of SD's work on your chemical plant project, whether the process is yours, SD's or a third party's. It is your best insurance of optimum plant performance and long-range economy.

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THE SD AFFILIATED GROUP:

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SD160A

Wiggins

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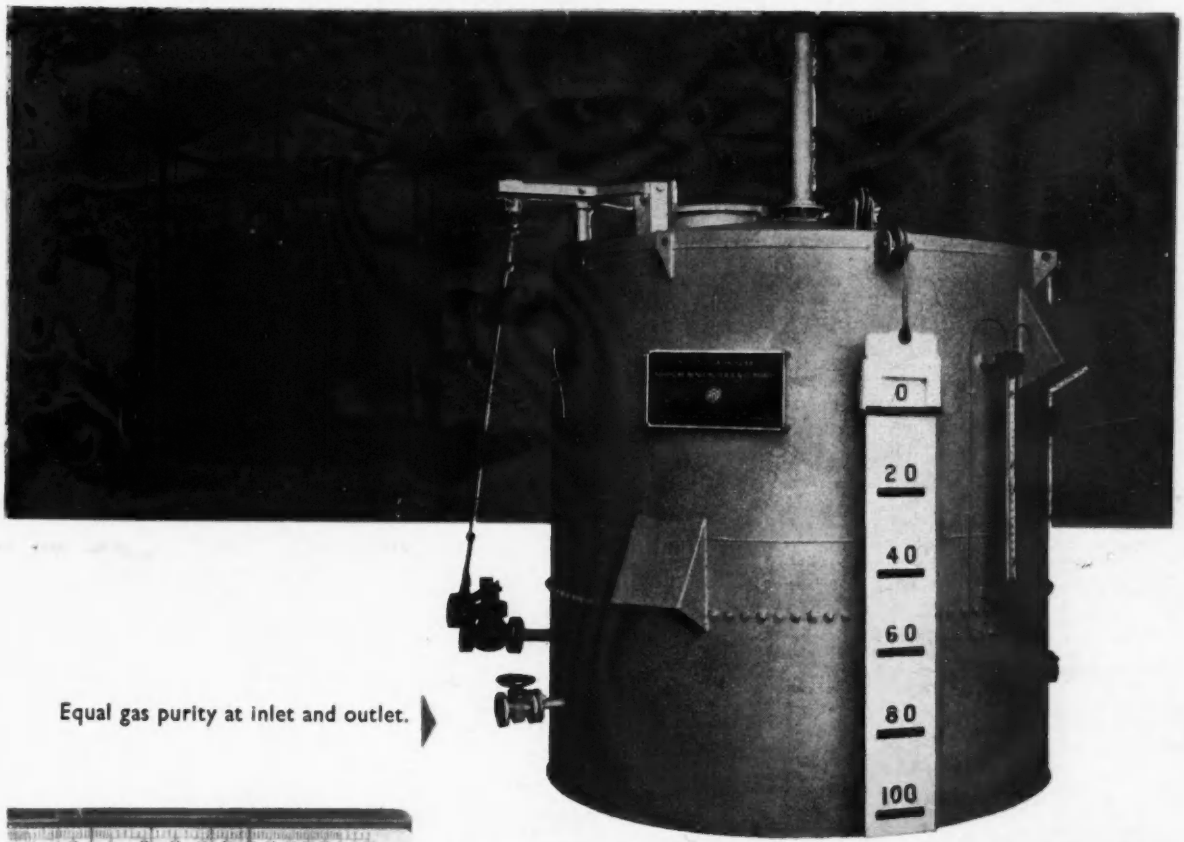
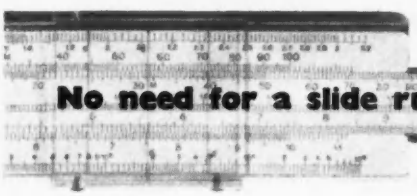


Equal gas purity at inlet and outlet.



No need for a slide rule . . . a Wiggins Gasholder will solve these 'equations' for you

(i) $\frac{\text{Pure Gas}}{H_2O}$	+ atmospheric pollution = $\frac{\text{Pure gas}}{\text{Contaminated } H_2O}$ = Impure gas, at outlet.
(ii) $\frac{\text{Acidic gases}}{H_2O}$	= Corrosion + leakage.

Capacity range of Wiggins gasholders—50 cu. ft. to 5,000,000 cu. ft.

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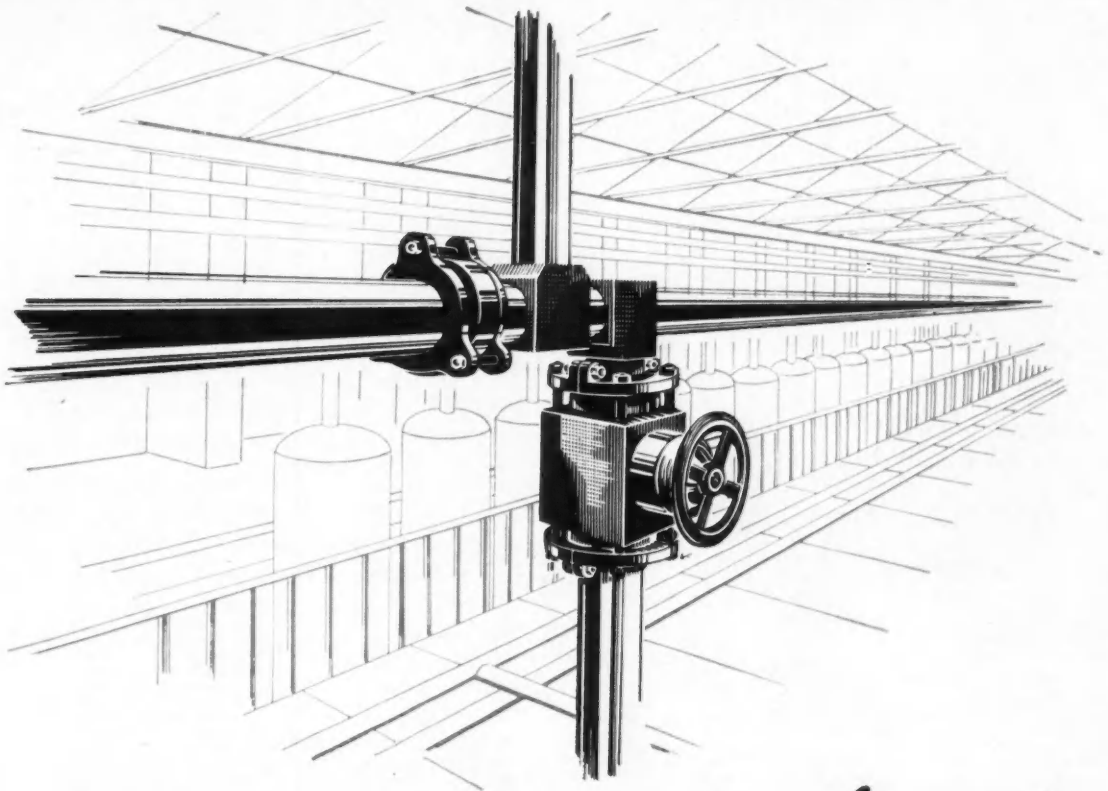

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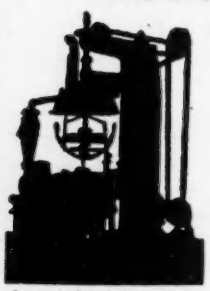

Steam jacketed copper Boiler and Mixer to tilt, with vacuum pump and jet condenser. Cover and agitator raised by bevel gear and hand-wheel

ESTABLISHED 1825

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LIMITED

WEST INDIA DOCK RD., LONDON, E.14.

Phone: East 3838 (3 lines). 1408 & 4160 Grams: Blundell Phone London

Resistance to chemical action makes 'Darvic' ideal material for photographic processing unit

THE photographic processing unit and washing unit shown were designed by Mr. A. N. Harding of British Petroleum's Photo Reproduction Branch, and built for them by Acalor (1948) Ltd., Crawley. Their special design prevents the overflow of processing chemicals which cause damage to the structure of buildings. Both units are made from 'Darvic' p.v.c. sheet Red 440 and Grey 995.

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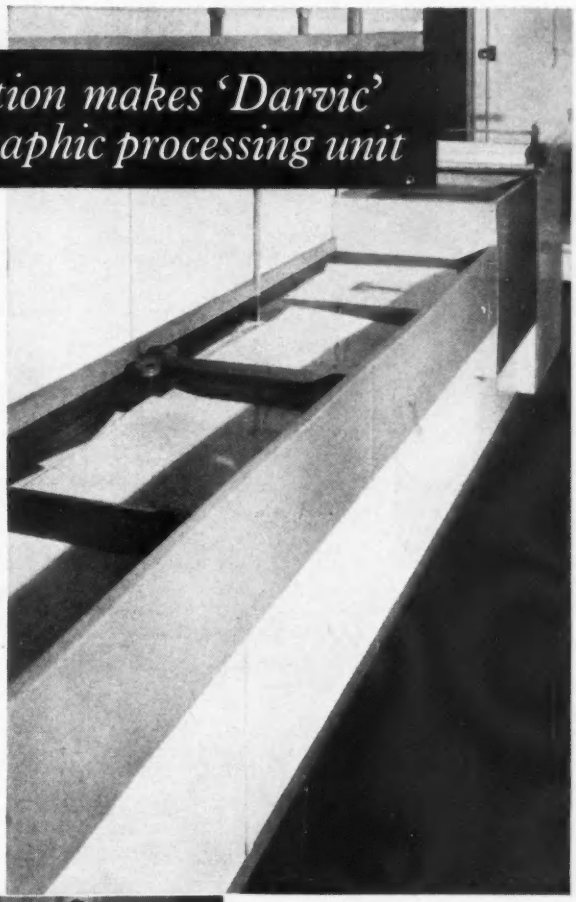

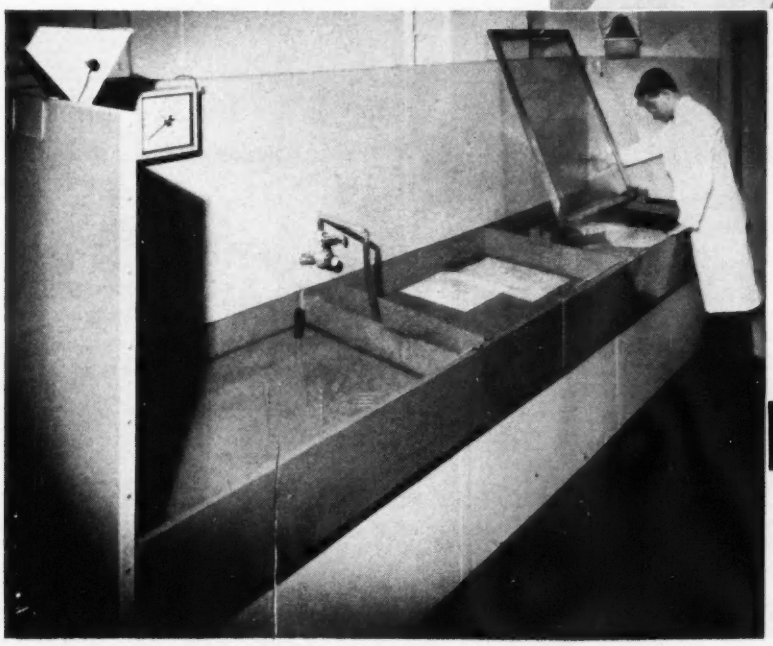

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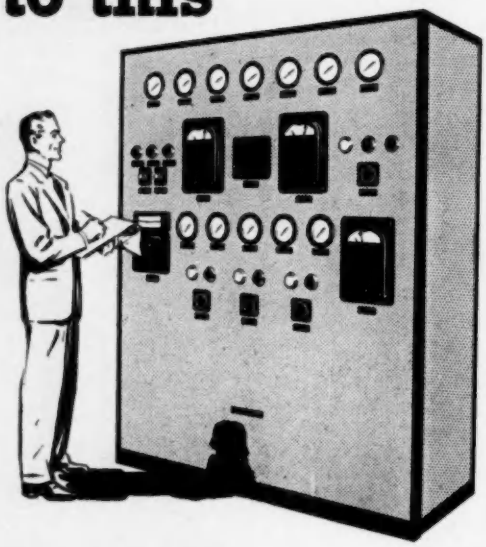

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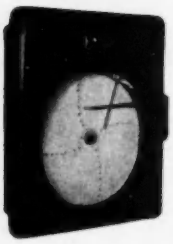

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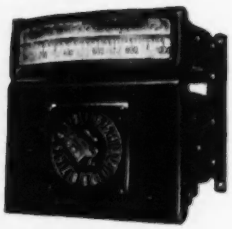

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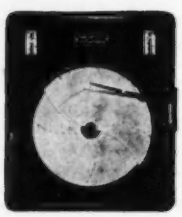

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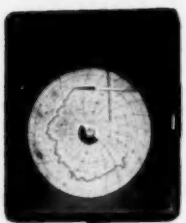

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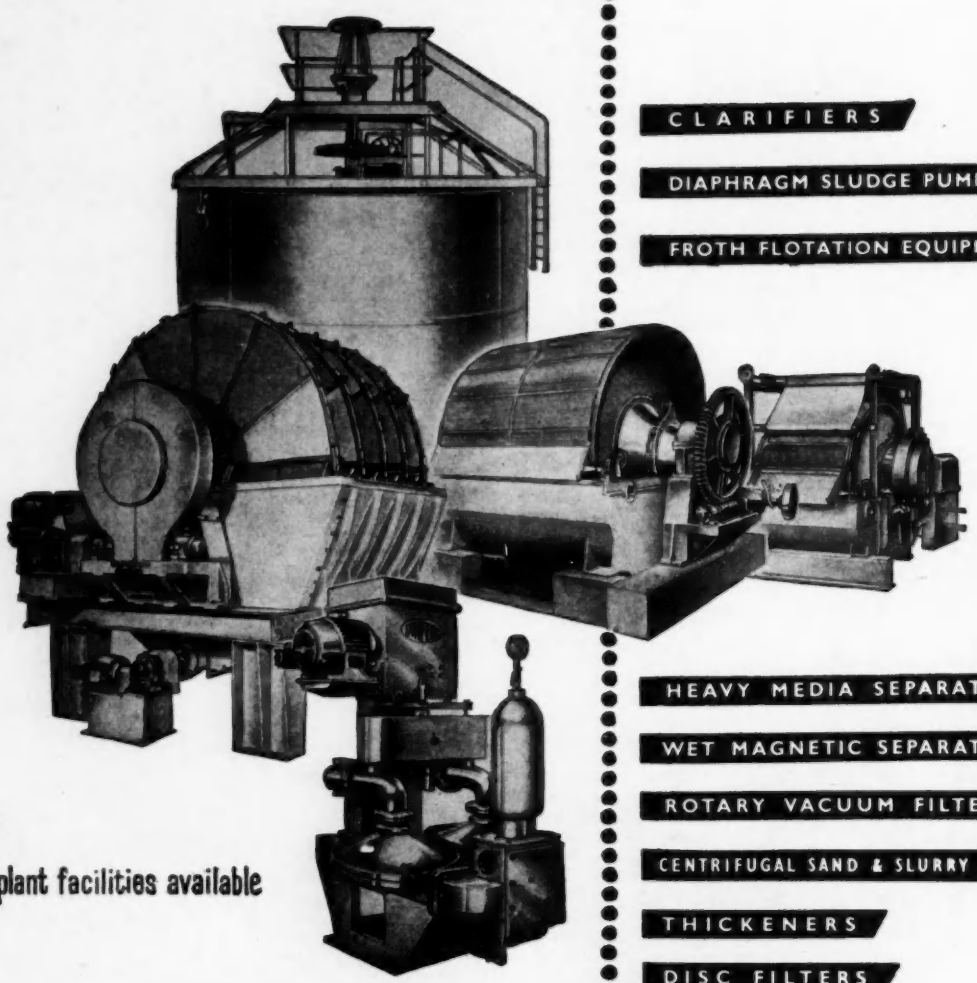

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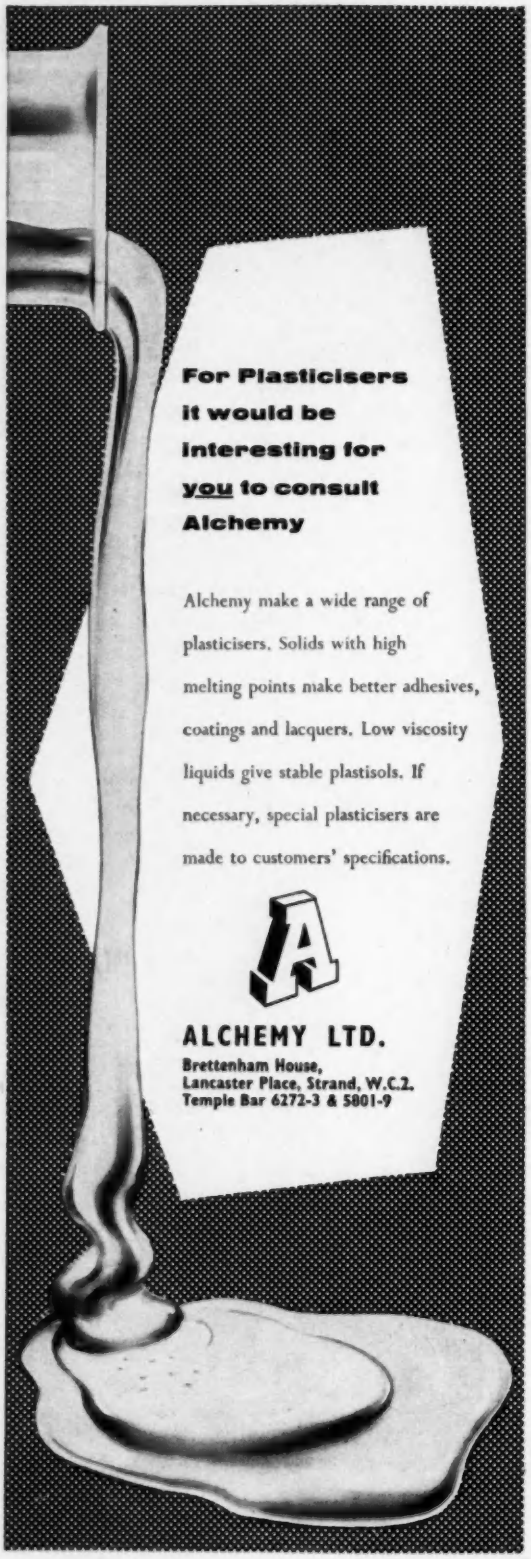

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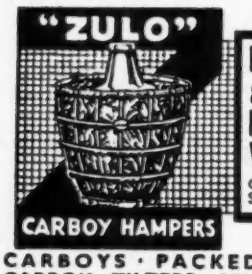

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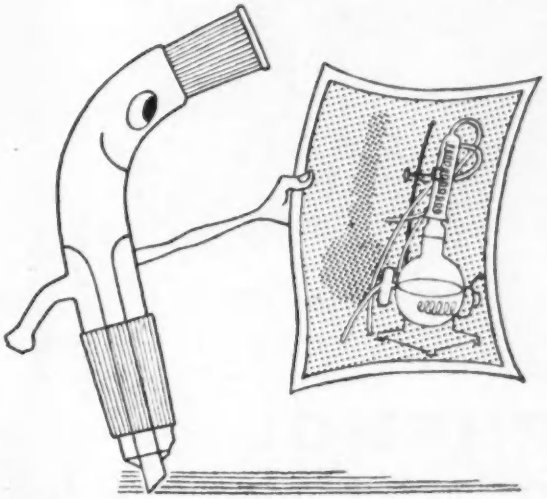

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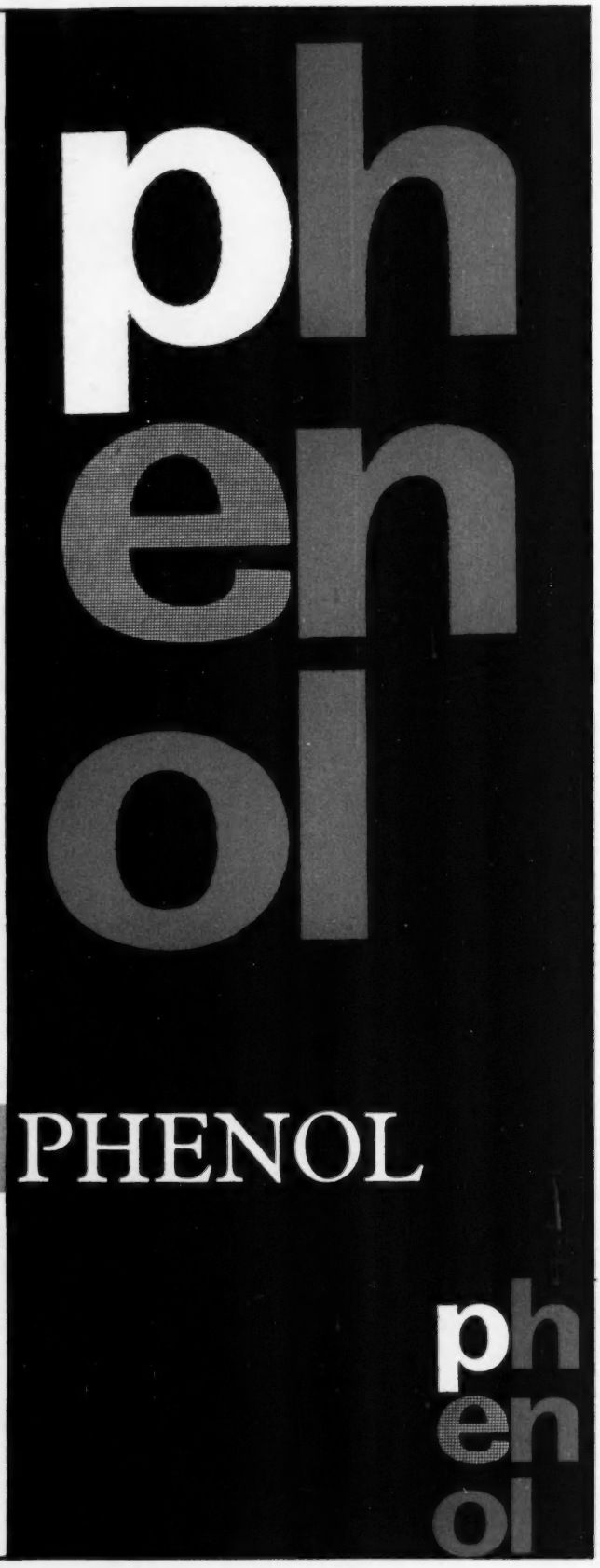

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CHEMICAL AGE

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SECRECY AND PLANT INDUSTRY

CAREFUL analysis of the relationship between chemical producers and chemical plant firms made by Sir Walter Worboys at the annual dinner of the British Chemical Plant Manufacturers' Association has led to lively discussions. This is all to the good for it should clear the cobwebs and, if tackled in the right spirit, lead to a much closer and more profitable partnership between the firms that develop and make the chemicals and those companies that specialise in plant construction.

Last week we summarised Sir Walter's remarks and discussed some of the problems facing the plant industry. But that is only one side of the coin; if chemical plant manufacturers have to set their houses in order, then so does the chemical industry. In fact since chemical makers are the customers of the plant industry, the lead must come from them.

Sir Walter gave some leads to the plant industry, instancing in particular the need for specialisation, where the most notable successes in co-operation have been recorded. He also called for an effort from chemical manufacturers, particularly in overcoming their deeply ingrained habits of secrecy. This secrecy-phobia has in our view been largely responsible for the present situation. The lack of experience of operating chemical plants and the lack of process know-how on the part of the British chemical plant manufacturers, have served to keep much construction work in the hands of the chemical industry itself. While this might give a company an immediate economic advantage in building a particular plant, it cannot be the most economic means of building new chemical plant taking the industry as a whole.

Not only is it wasteful in scientific and technical manpower, it also restricts a firm's construction to one, or maybe two plants of a particular type. A plant manufacturer, on the other hand, building several plants of a similar type can be expected to build its Mark V model much more cheaply than its Mark I—the result should be cheaper and more efficient plant, and cheaper and better chemicals.

But except in certain fields—notably petrochemicals, gas production, nitrogenous fertilisers and coal tar distillation—the larger chemical companies tend to keep design, engineering and construction to themselves.

Sir Walter was right when he said that "there is a mass of information and experience which is really non-confidential and which would benefit our industries as a whole if it could be made generally available." Apart from a very small proportion of information that can rightly be termed 'secret', the British chemical industry would lose nothing by making available much more of its process and operational data.

The benefits of such a policy would be immense. It would leave the chemical industry to get on with its major tasks of developing new chemicals and finding markets for them. It would make for a more efficient chemical plant industry; help eliminate the peaks and troughs in demands for new plants that are a bogey of plant constructors; and make for economies in the use of trained manpower.

At present the chemical industry is far too afraid of the imagined effects of making more information freely available. For instance, plant manufacturers are often forbidden to announce their appointment as main contractors

for a project, and even when the plant is satisfactorily on stream they do not always get just recognition for the part they have played. This 'dog-in-the-manger" attitude might have held good for the home market in the past, but it is certainly bad policy today, particularly so far as overseas trade is concerned.

At the B.C.P.M.A. dinner, Mr. H. W. Fender stressed that the British chemical plant manufacturer had been precluded from tackling a number of projects for Russia and elsewhere because he did not possess the process 'know-how'. He saw a solution in the development of the consortium idea, with chemical producers and plant firms combining to handle some of the larger overseas contracts. This is a sound idea and if implemented would help bring about the closer partnership that is so urgently sought.

For co-operation on this scale to be practicable, chemical manufacturers would have to make process and operating information more freely available. Only the chemical industry can provide the lead here and the Association of British Chemical Manufacturers might well place the subject on the agenda for regional meetings. In any event it would be a great pity if the efforts of Sir Walter and Mr. Fender to secure a closer partnership were to come to no avail.

PLASTICS AND BISPHENOL-A

REASONS for the bisphenol-A expansions in the U.S. are the growth of polycarbonates and the growing market demand for epoxy resins. Important in the use of bisphenol-A for polycarbonates is the quality of the material—a high purity material—with freezing point 156° to 157°C is required (for epoxides, 150° to 155°C can be used).

U.S. companies interested in polycarbonates to date are Mobay (jointly owned by Bayer A.G. and Monsanto Chemical, U.S.) now building a plant at New Martinsville, W. Va., and General Electric, building a plant at Mount Vernon, Ind. Both these plants are due on stream next year with capacities of 5 million lb. each. Columbia Southern are reported to be investigating polycarbonates; Eastman Kodak are also interested. Carbide Plastics are another possibility, since Union Carbide Chemicals have plans to build a plant to produce Sevin, a carbamate insecticide at either South Charleston or Institute, W. Va. Sevin can be made from l-naphthol, phosgene and methylamine, so phosgene would be available and not too far removed from Carbide's new bisphenol-A plant. (Polycarbonates are made by reacting bisphenol-A with phosgene).

Holding back development of polycarbonates are price and lack of wide potential applications. Price at present in the U.S. is quoted at $2.50/lb., but is expected to be introduced commercially at $1.25/lb. Lowest price foreseen is 75 cents, still in the speciality plastics class.

In 1960, production is expected to be about 4 or 5 million lb. and in 1965 the market may be 15 to 20 million lb., taking 15 to 18 million lb. of bisphenol-A. The market initially is expected to be in injection moulding or where its heat stability will be valuable. Elastomers, fluids, films and fibres are possibilities in various stages of development.

Meantime, the main market for bisphenol-A lies in the demand of epoxy resins. Demand for these resins is expected to be 31% better this year than in 1958. Up to 1965, growth is expected to average 10% a year, when production should be 90 million lb. a year and would require 75 to 80 million lb. of bisphenol-A (*Chem. and Engng. News*, 1959, **37**, No. 43, 22). Present sales of epoxies are for surface coatings (destined to account for about half of the epoxy production in 1965). Primers and other coatings may take 30 million lb., it is estimated.

A 42-HOUR WEEK

FOLLOWING swiftly on the announcement by the unions that Imperial Chemical Industries were granting a 42-hour week to between 60,000 and 70,000 of their manual workers (see CHEMICAL AGE, 7 November, p. 644), came the news last week that the Association of Chemical and Allied Employers had offered to reduce the working week from 44 to 42 hours for about 70,000 manual workers in the chemical industry.

The offer affects workers engaged in the production of plastics, fertilisers, and heavy chemicals by about 400 chemical companies in England, Scotland and Wales. It is understood, however, that as with the I.C.I. agreement, a number of conditions are attached to the offer, including a request that the unions should hold detailed discussions with the employers on the practical applications of the concession.

The unions involved include the Transport and General Workers' Union, the General and Municipal Workers' Union, and the Union of Shop, Distributive and Allied Workers. They are to meet later this month to consider the proposal. The unions had previously asked for a 40-hour week and when this was rejected they pressed for reduction by stages. In putting forward the 42-hour week offer the employers have not made any commitment regarding future reductions in their conditional proposal.

These moves by the chemical employers would seem to indicate a satisfactory relationship between the industry and the various unions. Indeed, the industry has had a singularly good record with no strikes. I.C.I., the largest chemical concern, as we indicated recently (CHEMICAL AGE, 31 October, p. 603), believe in joint consultation and in managers at all levels getting to know their opposite numbers in the unions. And it appears that other members of the industry incline to this approach.

Possibly the 42-hour week was the main idea in Sir Alexander Fleck's mind when he addressed the annual conference of the Institute of Directors last week. He appealed to private enterprise "to launch more examples of forward reaching industrial policies" and he considered that there was an unparalleled opportunity "for really constructive work in improving the whole tone of industrial relations."

In Britain, Fleck suggests, industrial relations are not nearly as good as they could be. He contends that where there is something wrong with the tone of an organisation the fault is frequently traceable either to a failure at the top or to a failure in communications from the top downwards. "Those of us at the top all too frequently think in terms of monolithic groups, the factory or the trades union, when we should be thinking more of the individual men who compose them".

These sentiments are timely, we suggest, as difficulties at the top have arisen because of industry becoming large, complex and remote; and such difficulties are likely to become more pronounced if the now well-tried joint consultation is not applied. As Fleck points out, "hard, solid and above all persistent cultivation of good relationships at all levels is required all the year round if the effort is not to be wasted." Profit-sharing and co-partnership schemes, he states, are not a substitute for good relationships, but given that an amount of goodwill already existed, they could both be used to increase co-operation. All such schemes he regards "as very rich top dressing only to be applied to ground already well prepared." If applied wrongly, all the good will be wasted.

Fast approaching is the time when it will be difficult to distinguish between manual workers and office staff. It must be left to the directorial boards of companies to smooth over the transitional period, but the chemical industry is certainly successfully leading the way.

FISONS ATTAIN AMBITIOUS TARGETS FOR CHEMICALS AND PLAN NEW PRODUCTS

AFTER careful consideration of the existing group structure, the board of Fisons Ltd. has reached the conclusion that it would be in the best interests of the company to divest itself of all trading activities and to become a holding company. This decision, it is stated, will involve principally the transfer of the activities of the Fertiliser Division to a subsidiary, to be called Fisons Fertilizers Ltd.

Fertiliser Division Report. Although final figures for the U.K.'s total consumption of fertilisers during the year 1958-59 are not yet available preliminary assessments indicate that the upward trend has continued although the rate of increase was not as high as the previous year. A contributing factor was the difficult harvest of 1958, while the chief contribution to the increase has arisen, it is stated, from additional consumption of nitrogen and potash with phosphates remaining more or less static.

Increased use of high grade granular compound fertilisers has continued with demand for '40' range compounds increasing at a progressive rate. Still higher grade fertilisers are planned for the future, Fisons announce. Fertiliser sales did not quite reach the record established in 1957-58, as a result of keener competition due to increased productive capacity of the industry. Prices have been still further reduced by significant amounts and partly due to these price reductions and to the excellent weather sales for the current year (1959-60) are reported as well ahead of last year.

Stanford-le-Hope

Full production has not yet been achieved at Fisons' Stanford-le-Hope nitrogen plant, due to circumstances outside their control. The company believes, however, that incorporation of ammonium nitrate in its compounds will enable it to offer better and higher grade fertilisers to an increasing extent.

Raw Materials. There has been no upward trend in freights during the current year, Fisons note, and unless anything unforeseen occurs they are unlikely to vary much in the immediate future. The phosphate position in North Africa, however, still remains uncertain. Slightly better terms for phosphate purchases have been obtained and it has been possible to spread these over a wider field.

Two years ago the company's index of raw material costs (base 100 in 1953-54) was 132.1. Last year this had fallen to 122.3—an important factor in assisting the company to reduce prices.

Horticultural Products. Sales have continued to expand in the horticultural department. In the amateur gardening products' range, insecticides and weedicides have been included and the compound insecticide, Kil, and Weedex, a total herbicide, are reported to have obtained a substantial share of the market. Interests in the "rapidly expanding field of liquid fertilisers" has been extended by the acquisition of the Liquinure trade mark, formulations and manufacturing rights.

The Chemical Division. Expectations in Fisons general chemical interests have been realised and the "very ambitious" targets set have been attained. Chemical sales are reported to be more than £1 million higher.

The position of Fisons Pest Control Ltd. in the home weedkiller market has improved. Fisons believe that a sound research policy and a suitable organisation has been devised. A "regular flow of new ideas" is being received from the company's research organisation at Chesterford Park and it is very active in its search for new products overseas. Reference is made in Sir Clavering Fisons' statement to the arrangements with Spencer Chemical Co, Kansas, for Carbyne (CHEMICAL AGE, 7 November, p. 644) and for other important new products under development both of Fisons own invention and from licensing arrangement.

Pharmaceuticals. Benger Laboratories, a Fisons company, have made excellent progress, it is reported. There is some reason for concern in regard to one of the company's 'major products'. Genatosan Ltd., Fisons' other pharmaceutical concern, having shown a "decline in profitability" have had their organisation streamlined.

Realignment of Whiffen. In the case of Whiffen and Sons Ltd., which have been subject to a "radical realignment", the result has been a net increase of profitability as compared with the previous year at a rate of over £200,000 per annum.

Future Prospects. Budgets for the Chemical Division envisage a further substantial increase in net profit for the present year.

During the second half of the year demand for chlorine increased and Murgatroyd's Salt and Chemical Co. Ltd., in which Fisons have a half interest, showed a maintained profitability.

Research. Expenditure on research, development and advisory services continues at a "high level, not far short of a million pounds a year". Half of this is in support of Fisons' fertiliser business. The other half is in aid of the group's interest in other branches of the chemical industry.

I.C.I. Produce First U.K. Heat Transfer Medium from Phenol Derivatives

THE first heat transfer medium of its type to be produced commercially in Britain has been added to the range of phenol derivatives made by I.C.I.'s Heavy Organic Chemicals Division. Sold under the trade name Thermex, it is a eutectic mixture of diphenyl oxide and diphenyl in the proportions by weight of 73.5% and 26.5% respectively.

A highly desirable combination of physical properties makes Thermex particularly suitable for liquid-phase and vapour-phase heating and cooling in a variety of industrial processes. It has a high boiling point (255°C) and low freezing point (12°C), and excellent thermal stability over long periods at temperatures up to 400°C.

At high temperatures, Thermex operates at low working pressures. For instance, at 250°C, when steam is at a gauge pressure of 565 lb./in.², Thermex is still in the liquid phase and at atmospheric pressure. At 350°C the gauge pressure of steam is 2,385 lb./in.², while the comparable pressure of Thermex is only 80 lb./in.² In vapour-phase heating, very accurate temperature control may be achieved simply by regulating the pressure.

Typical examples of industrial processes in which Thermex can be used are: the melting and spinning of synthetic fibres; the distillation and processing of fats, vegetable oils, petroleum fractions, and other high-boiling products; the concentration of sulphuric acid and caustic soda solutions; the processing of plastics and rubber products by extrusion and moulding techniques, etc.

D.C.L. Produce First U.K. 3 : 4 Lutidine for Narcotic Synthesis

A NEW chemical now available commercially for the first time in the U.K. has been added to the Bisol range of the Chemical Division of the Distillers Company Ltd., Devonshire House, Mayfair Place, London W.1. It is 3:4 lutidine (3:4-dimethylpyridine), a useful intermediate with pharmaceutical applications.

3:4 Lutidine is the starting point for the synthesis of a new narcotic (NIH 7519) developed by the National Institute of Health, Bethesda, Maryland, U.S., which is chemically 2'-hydroxy-5:9-dimethyl-2-phenethyl-6:7-benzomorhan. NIH 7519 is said to be more potent and safer in use than morphine.

An amber coloured liquid the technical grade has a specific gravity at 20°/20°C of 0.955-0.960; total bases as lutidine are 97% (min.); distillation range is 95% 176° (−179°C); water content is 1.0% (max.). 3:4 lutidine is soluble in ethanol and ether and is steam volatile. Toxicity is probably of a similar order to that of pyridine.

★ A NEW safety drive introduced as an experiment at the Kirkby Works of Albright and Wilson (Mfg.) is being watched by all the factories in the group. The scheme is based on the fact that the major cause of industrial accidents is 'sloppiness', or failure to do a job neatly and cleanly. Designed to make the works even more safety-conscious than it was before, it is essentially an incentive to good housekeeping.

The factory has been divided into six areas which coincide with the departments. Snap inspections are carried out both by the works management and by neutral observers. One example of a common cause of accidents was men lifting heavier loads than they could manage. In the scheme points will be lost for such things as untidiness and at the end of the year points will be totalled and the men with the highest number in each area will be given two tickets for a local entertainment or their equivalent.

Kirkby is a new factory, where about 100 tons a day of tri-polyphosphate are made. This product makes up about 40% of every packet of detergent sold in Britain.

★ A WARNING note on the new Brussels tariff so far as chemicals are concerned has been sounded. The international chemical organisation Centre Européen des Fédérations de l'Industrie Chimique (C.E.F.I.C.), in which the chemical producing associations of the U.K., Belgium, West Germany, France, Holland, Italy, Austria, Sweden and Switzerland are represented, has sent to the Ministries of Trade of the countries concerned a note expressing its concern at the provisions of the Brussels Customs Tariff Scheme.

The customs tariff committee is said to be working out 'notes implicatives' dealing with a uniform enforcement of the provisions without co-operation with the industries concerned or the industry in general of the countries concerned. C.E.F.I.C. sees the workings of the committee and the bringing into force of certain provisions as being a threat to progress within West Europe and has asked the Governments to intervene at the Brussels Customs Council.

They are warned of the danger of the implementation of the 'notes explicatives' with the countries affected and their mutual trade.

★ IN announcing the new potent 'synthetic' penicillin, (see CHEMICAL AGE, 31 October, p. 609) in America, Bristol Laboratories, Syracuse, U.S., revealed a few more details about the production of 6-aminopenicillanic acid, the penicillin nucleus from which the new penicillin is produced.

The nucleus is produced via biosynthetic techniques developed by Dr. F. P. Doyle and Dr. G. N. Robinson *et al.* at Beecham Research Laboratories, Surrey. The molecular nucleus appears with the natural penicillin product in the fermentation broth. The Beecham process stops the fermentation immediately after formation of the 6—APA. Ion-exchange extracts this material quite easily, Bristol state, and in this way *P. notatum* moulds produce 6—APA in good quantity at low cost. Appropriate side chains are attached to the penicillin nucleus through synthetic procedures discovered by Dr. John C. Sheehan at Massachusetts Institute of Technology.

I learn also that Chas. Pfizer and Co. U.S., who announced an improved penicillin, Maxipen, almost simultaneously with Bristol in the U.S. and Beecham in the U.K., have revealed that their new penicillin is also α-phenoxy ethyl penicillin. One of 1,200 synthesised and tested by Pfizer, the product is stated by the company to have been the discovery of Dr. H. T. Huang and Dr. T. A. Seto.

★ THE brainchild four years ago of a doctor and her electrical-engineering husband has now established itself as 'by far the largest ion exchange regenerating service in Europe.' Mr. W. F. Lorch, managing director of Elga Products Ltd. told me recently how his wife had put to him the need for doctors to use solid-free water in their sterilisers if they were to avoid the build-up of scale on their instruments.

This idea led to the formation of the company, Ion Exchange Division, and its process for regenerating ion-exchange resins. On a visit to Mr. Lorch and his dedicated team of enthusiasts at their delightful new headquarters in the Chilterns I saw the regeneration process.

There are obviously big potential outlets for deionised water in this country. In the U.S. deionisers are installed in large laboratories as a matter of course. For the new Birmingham chemistry laboratories and the newly completed London School of Pharmacy deionised water is provided by a 'third tap.' Present usage in the chemical and pharmaceutical industry is capable of expansion, while a vast market awaits exploitation in the garage field.

★ AT their meeting on 17 November, the Parliamentary and Scientific Committee will consider the recommendations of the Pritchard Committee on the rating of scientific societies. Societies instituted for the purposes of science, literature or the fine arts were exempted in 1843 from the payment of rates, apparently with the intention of putting their buildings on a par with buildings dedicated to public purposes. Several of the societies now exempt appear to be basically different from the kind of institution which M.P.s probably had in mind when they spoke for the Bill in 1843.

The division between societies exempt under the Act and those outside it is arbitrary and the committee believes that even if exemption for some were justified there is no obvious way of distinguishing those societies from others and that any new dividing line must result in anomalies and produce a fresh spate of litigation. It feels that the Act should be repealed; most of the societies are charities and would be entitled under the committee's recommendations to 50% mandatory relief as such.

It was put to the committee that industrial research associations, which enjoy the same reliefs from income tax as charities, should be given 75% relief from rates. The committee feels, however, that they are more akin to research establishments conducted by individual firms and that they should have the same reliefs.

★ Two major Common Market mergers that will greatly strengthen the competitive position of the French chemical industry have recently been announced in this journal. Under an agreement signed in Paris at the end of October, St. Gobain and Péchiney are to form a joint subsidiary to handle a new co-operative scheme in chemical production and marketing.

The production programmes of the two companies are to be phased so far as chemicals are concerned for the most economic production of specific items; the term 'chemical products' is stated to include synthetic fertilisers and plastics. Also as part of the C.M. rationalisation programme, Péchiney are taking over the two French chemical companies of Soc. des Produits Chimiques des Terres Rares and Soc. des Produits Chimique de Ribécourt. Capital of both is to be increased substantially.

More details also reach me from Paris on the newly formed chemical company —Progil-Bayer-Ugine, a joint subsidiary of Soc. Progil and Soc. d'Electro-Chemie, d'Electro-Metallurgie et des Acières Electriques d'Ugine and the German Farbenfabriken Bayer AG. The Bayer share will be held by their Canadian holding company, Bayer Foreign Investments Ltd., Toronto.

This combine will produce at Pont de Claix, Isere, isocyanate, polyester and polyether, mainly for sale in the franc zone. These materials are destined chiefly for the lacquer and adhesives industries and for Bayer's polyurethane foam Moltopren.

Alembic

Letter to the Editor

C.A. Survey Suggests No Lack of Confidence in U.K. Plant Industry

SIR,—The editorial in your issue of 7 November states that 'the chemical plant manufacturer's own research and engineering department staffs have not generally been of the same calibre as those of the chemical manufacturer and confidential information on technical know-how has not always been handled satisfactorily.'

In the context in which this statement occurs the reader must assume that it was made by Sir Walter Worboys speaking at the Association's annual dinner. In fact he neither said nor inferred this and what he actually said is correctly reported on a later page of the same issue.

If, however, the statement is intended to be editorial comment, we should be glad to know how you justify it. The contracts recorded in the survey of new plants in your issue of 26 September do not suggest lack of confidence in the British chemical plant industry.

Yours, etc.,
H. W. FENDER
Chairman

British Chemical Plant
Manufacturers' Association,
London S.W.1.

(We believe the above quotation to be a fair statement based on what Sir Walter said at the dinner (C.A., 7 November, p. 641).

Our survey of new plants showed that much of the major contracting work by the chemical plant industry is in petrochemicals, gas production and nitrogenous fertilisers. Sir Walter quoted these fields as showing how a high degree of confidence between chemical and plant firms had led to substantial business. He suggested that the plant industry would find it worth while to study why this had happened in these fields.

Our belief that the lead in building up a closer partnership between the chemical and plant industries must come from the chemical manufacturers is expressed in our leading article this week. (*Editor*).

B.o.T. Decontrol Trade in Calcium Carbide

LIST of goods to be freed from the control scheme introduced for the Dollar Area some 20 years ago has been released by the Board of Trade. A few controls will still remain on imports from this area, and from Western Europe and other countries in the 'relaxation' area, such as those affecting radioactive materials, arms and ammunition. It should be noted, also, that China is being transferred for licensing purposes from the 'relaxation' to the Eastern Area which contains the U.S.S.R. and other members of the Sino-Soviet Bloc. Among items listed as freed from the controls are scientific and industrial instruments; calcium carbide. A new amendment to the Open General Licence will shortly be available.

Cyanamid's New Broad-spectrum Antibiotic to be Made in U.K.

A BROAD-SPECTRUM antibiotic said to be more potent than tetracycline and active against more bacterial strains has been developed by Cyanamid International. The new drug, Ledermycin demethyl-chlortetracycline (DMCT), was the subject of reports by 13 medical investigators at the seventh annual symposium on antibiotics at Washington D.C., on 5 November.

Ledermycin is a naturally occurring antibiotic, produced by an offspring of the organism from which tetracycline (Aureomycin) was isolated in 1946. At present DMCT is being produced at Cyanamid's Lederle Laboratories Division, Pearl River, New York, but it is expected that some of the overseas manufacturing plants will start production during 1960.

DMCT was found to be twice as active as tetracycline against six of a group of nine species of disease-causing bacteria isolated from infected patients. Dr. L. P. Garrod and Dr. Pamela Waterworth of St. Bartholomew's Hospital, London, have reported that their study included 275 strains of the bacteria and in no case was the new drug less active than tetracycline. They also reported that a DMCT broth was more effective in controlling in vitro growth of *Staphylococcus aureus* than the same concentration of chlortetracycline.

Other antibacterial studies at Harvard University and University of Virginia, comparing the antibacterial activity of DMCT in the blood with that of tetracycline following repeated oral doses of both compounds in healthy volunteers showed effectiveness against test organisms that was generally superior, striking, and significant.

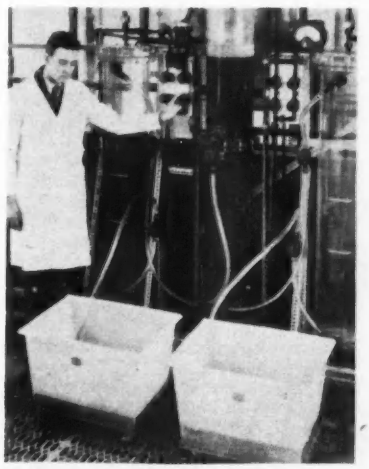
Cure of venereal diseases by small total doses of DMCT was regarded as "striking" and "noteworthy" at New York's Harlem Hospital. For the cure of gonorrhoea, the required total oral dose of the new drug is stated to be almost as small as the required injected dose of tetracycline. For tetracycline, the oral dose is usually twice the injected dose.

Mr. O. N. Williams, managing director of Cyanamid of Great Britain Ltd., has said that although the company's plans for the manufacture of Ledermycin in Britain should result in its production during 1960, it would be premature to forecast a release date.

Elga Ion Exchange Regeneration

A HOUSE-WARMING party at the new Lane End, Bucks, headquarters, of Elga Products Ltd. was recently attended by about 50 research workers from universities and technical colleges and by members of industry. The Elga ion-exchange regeneration division, the largest service regeneration centre in Europe, aroused most interest.

Exhausted Elgastat cartridges received in the morning are exchanged for freshly regenerated cartridges the same day. On arrival, they are sorted according to type and the resins emptied into polythene containers, each holding some 6 cu. ft. The empty cartridges are washed, sterilised and prepared for refilling.



Syphoning into the regenerating columns at Elga Products

After the introduction of a wetting agent, the resins are syphoned into the regeneration columns. All sterilising, separation, back-washing, regeneration and rinsing are carried out automatically. The Elga system of deionisation involves the passage of the tap water through intimately mixed, strongly acidic basic exchangers; hence the need for a separation cycle-centre system.

Anions are separated into one column to be regenerated with caustic soda and cations pass to another column for regeneration with hydrochloric acid. The columns are back-washed to free suspended impurities. Regeneration, followed by soaking, is a five-hour cycle and is carried out twice each 24-hours.

After this process, anions and cations are rinsed and then brought together in an Allite mixer.

About 1,000 gall. of deionised rinse water are used per cubic foot of resins to wash out surplus regenerants. This rinsing cycle is said to be largely responsible for the high effluent quality and yield from Elgalite resins.

Cartridge batch testing is carried out to ensure that the product is up to quality; the company states that its resins have a purity of up to 20 megohms. In addition, oxygen absorption tests are applied to resins for the provision of purified water B.P.

SILICON NITRIDE DEVELOPED BY ADMIRALTY FOR USE AT TEMPERATURES UP TO 1,200°C

NEW material having excellent thermal shock and oxidation resistance and adequate creep strength at 1,200°C has been produced by the Metallurgical Division of the Admiralty Materials Laboratory as a result of a search for stator blade materials for use in gas turbines at 1,200°C. The best material was found to be silicon nitride stiffened with a fine dispersion of silicon carbide. Details of work leading up to the development of this new high temperature material, methods of producing components in the best physical form for projected applications, together with a short account of its properties and field trials are contained in an account by D. M. Rae, of the Admiralty Materials Laboratory, in the latest National Research Development Corporation bulletin (*NRDC Bulletin*, 15 October). Rae's article is based on A.M.L. Report No. A/75(S) by N. L. Parr, G. F. Martin and E. R. W. May.

The new ceramic material is composed of cheap, non-strategic materials, can be formed to very close tolerances by conventional machining methods in contrast to most other ceramics which shrink badly at some stage in manufacture, and has good mechanical strength at temperatures up to 1,200°C.

Two Phases

Silicon nitride, Si_3N_4, exists in two distinct phases, both of hexagonal structure, the α-phase is formed at temperatures below 1,400°C, and the β-phase above 1,450°C. At intermediate temperatures a duplex structure results. It is not wetted by any of the common metals nor is it attacked at room temperature by gases containing sulphur or chlorine, and it is resistant to most liquid acids. It is attacked by hydrofluoric acid, although it is more resistant than silica and it is also attacked by potassium hydroxide at about 400°C and by sodium sulphate and vanadium pentoxide at 1,000°C.

Mechanical Properties. Bulk density of fully reaction-sintered nitrides varies between 2.2 and 2.6, it is reported, so that the final product contains between 20 and 33% voids. Coefficient of linear expansion is 2.5×10^{-6} per °C over the range 20° to 1,000°C. Thermal conductivity at a specific gravity of 2.2 is given as 0.0037 C.G.S. units. Electrical resistivity when dry is about 1.4×10^{7} ohms-cm., and the dielectric constant is 5.3 at 5 megacycles, when the loss tangent is 0.067.

Results of thermal shock tests of specimens of silicon nitride show that these can be subjected to as many as 50 cycles of rapid heating at 1,000°C. and cooling before radial cracks begin to appear at the edges.

Surface Treatment. Silicon nitride is attacked by few molten metals, but is attacked at high temperatures by some molten salts, of which sodium sulphate and vanadium pentoxide are of importance. It has been found possible to glaze a porous silicon nitride component with a silica-alumina glaze so that it is not attacked by the molten compounds after 24 hours at 900°C.

Applications. This new ceramic material was originally intended for use as stator blade material in a high temperature gas turbine. After 250 hours of intermittent service when a failure in another part of the turbine caused one of the rotor blades to break off, one silicon nitride vane showed slight dripping of the trailing edge but the other was in perfect condition. It has been found practicable to use silicon nitride as a bearing material for the nimonic alloys at gas turbine operating temperatures.

The good thermal shock resistance and high electrical resistivity make silicon nitride a potentially valuable material for electrical insulators which are subject to violent temperature changes such as are met with on rocket launching platforms. Because of its high thermal shock resistance and chemical inertness it is suggested that silicon nitride may also be of use as a support for high temperature catalysts, as thermocouple sheaths, crucibles, supports for advanced heat treatment and containers for special purification and diffusion operations such as are employed in the semiconductor field.

New N.R.D.C. Inventions

SOME of the interesting new inventions being handled by the National Research Development Corporation are described in the latest *NRDC Bulletin* (15 October issue, Part I).

In the scientific instrument section a new type of laboratory separating funnel developed by I. E. Bush of St. Mary's Hospital, London, is described (Patent Application No. 10401/57). The general method used to separate substances by dissolving them respectively in immiscible solvents, means that it is often necessary after the initial extraction to add further solvent to the remainder, shake and separate again and repeat this process several times. With the usual type of separating funnel where the outlet tube is at the bottom separation involves drawing off the heavier liquid every time, which is inconvenient if the substance to be extracted is in this heavier liquid.

The new funnel overcomes this disadvantage by having a second outlet tube approximately midway along the funnel tube, so that, by tilting the funnel, it is possible to pour off the lighter layer of a stratified mixture.

A new desiccant from coal—Karbogel, is reported (NRDC India, Pat. Appln. No. 11349/56). This desiccant is reported to possess desiccating properties comparable with silica gel. It is a granular, porous, solid material with a bulk density of about 25 lb./cu. ft. (dry basis) and can be prepared in any size range and of a uniform quality. At 95% relative humidity, it has a 'dry gas capacity' (D.G.C.) of about 11%. It appears dry even after absorption of 35-40% moisture at saturation point, is chemically stable, inert, non-corrosive, non-toxic, and easily reactivated at 100-110°C.

It is believed that Karbogel can find extensive use both in industry and laboratory as an efficient and cheap desiccant. Special advantages seen over silica gel are that it can be reactivated at a much lower temperature and undergoes much less attrition loss during the heating and cooling cycles. Important characteristics of Karbogel listed are (1) quality is not affected by long storage, (2) the gas dried has sufficiently low dew point, (3) the moisture carrier, whether air, oxygen or nitrogen has no effect on the D.G.C., and (4) the D.G.C. is generally not influenced by the particles size of the gel.

Epoxy Primer for Polyurethanes. Royal Aircraft Establishment, Ministry of Supply, have developed a primer for promoting adhesion of polyurethane resins to other materials and comprises an epoxy resin with a hot-setting tertiary amine hardening agent in the epoxy resin. The primer can be made as a solution to facilitate its application to the surface of the mould or other objects (Pat. Appln. No. 3341/59).

Stable Polyurethane Adducts. Stable adducts which will convert with hardener to form films are produced by first reacting a polyester or other long chain polyol with a deficiency of naphthalene diisocyanate and subsequently reacting the adduct so obtained with an excess of toluene. The resulting adduct was found to have suffered no appreciable viscosity change after storage of six weeks in daylight at room temperature with no provision for an inert atmosphere (Pat. Appln. No. 24513/57).

Liquid Absorption of Gases by Use of Foam. This invention, it is stated, is a means for the total foaming of liquids without the addition of surface active agents, and has particular application to processes where liquids are to be acted on by gases, e.g. in scrubbing towers.

U.K. Chemical Production Runs at High Level

Production in the chemicals and allied industries in June was at the rate of 131, based on a 1954 index figure of 100, according to the Board of Trade's index of industrial production. The June figure compares with a second quarter 1959 index of 129, and an average 115 for both 1958 and 1957.

SUPERPHOSPHATE MEETING IN STOCKHOLM

Use of Glass Coolers for Sulphuric Acid at S.A.I. Plant

OPERATING experience of a cooler on a sulphuric acid plant of the Petersen type made of borosilicate glass pipes which is in use at Scottish Agricultural Industries Ltd. was reviewed by J. P. A. Macdonald and G. B. Whyte at the recent meeting of the International Superphosphate Manufacturers Association in Stockholm.

Normally lead is used for denitrated acid on Petersen plants, while for nitrous acid vertical cast iron pipes are usually adopted. Because of the high cost of lead and unavailability of vertical cast pipes at the time of construction of the S.A.I. plant, it was decided to use borosilicate glass for all coolers. Anticipated advantages were that the glass would be immune from chemical attack from nitrous and denitrated acids, free from external corrosion and unaffected by scale formation from the cooling water.

Two Main Conditions

The coolers were designed to deal with two main acid conditions: (a) 45-g.p.m. (12M3/hr.) of 76/80% H_2SO_4 denitrated acid to be cooled from 120/140°C to 35°C; and (b) 375 g.p.m. (1000 M3/hr.) of nitrous acid at the same H_2SO_4 concentration but having 1·5/3·5 HNO_3 to be cooled from 90/100°C to 35/40°C. The arrangement provided for gravity flow from elevated towers resulting in a maximum pressure at the base of the coolers of 17 p.s.i. (1·2 kG./cm.²).

Operating Experience. In the first few months of plant operation serious breakage of the glass pipes, arranged in banks of serpentine pipework (2·7 miles) of 3 in. (76 mm.) bore and 3 mm. wall thickness tubing, was experienced. This was found to be due to the form of glass construction used in which a 180° bend and two approximately 11 ft. lengths of straight pipes were made in one piece to form an elongated 'U.' The troublesome sections of glass were therefore completely replaced by standard straight lengths of tube and separate short U-bends at the end. Since that time breakage of glass pipes has been almost unknown.

Problems with Joints. While glass breakage was successfully resolved, leaks from pipe joints continued since the asbestos jointing material with the Fluon sheath was very hard and did not readily conform to variations in the face of the glass pipes; water absorption caused fracture of Bakelite flanges; and swelling of asbestos inserts, resulting in the fracture of flanges.

An entirely new approach was therefore tried and the new tube joint, the subject of patent applications here and overseas, takes the form of a pliable sleeve enclosed in a metal fixing head, the latter having a number of fingers. This band is tightened by means of a clip at each end. Because of expense, only sufficient acid resisting material (Fluon) is used to form the seal across adjoining pipes, while the remainder of the pliable sleeve is made of resilient material such as Hypalon or butyl rubber, suitable for the operating temperature. The fixing band and clips have been made of stainless steel to give protection against corrosion from the cooling water.

Basic features of the new joints are: no tensile stress is transmitted to the pipe as a result of tightening the coupling; as the joint remains flexible, movement from thermal or other causes does not affect tightness of the joint nor results in significant tensile stress on pipework; the new tube joint enables coolers to be constructed with pipes at much closer pitch so that a more compact cooler is obtained, requiring less head for acid flow and offering improved conditions for water distribution. Finally although specially developed for glass pipework, the principles apply equally to any pipe constructed in material having a low tensile strength, e.g. stoneware, carbon, silicon iron, etc. These tube joints have been in service for over 12 months without showing any defect. Some 1,900 joints have been installed and no attention has been required.

Cooling Efficiency. The coolers have been constructed at an overall height of 7 ft. for 15 tubes high as against 13 ft. for 17 tubes high necessary with the flanged joints. The compact arrangement has been found to give valuable benefit in terms of water distribution. With closer pitch between pipes (1½ in. gap in comparison with 5½ in. previously) assisted by narrow timber strips under each pipe, a completely uniform film is provided over all pipes in the cooler. The heat transfer co-efficient obtained during test at 27 CHUs/sq. ft./hr./°C compares favourably with a figure of 27/28 CHUs/sq. ft./hr./°C (131/136 kg. cals./M²/°C/hr.) for 3 in. bore cast iron cooker pipes at a similar acid velocity.

Conclusions. Macdonald and Whyte state that the coolers on S.A.I.'s sulphuric acid plant using the old pipes and bends but reconstructed with the new coupling's have given six years service. They doubt if any other low cost material can offer such permanent use as a heat transfer medium. Although fresh water is being used, sea water or contaminated waters could be used without fear of external corrosion or scaling. The pipes have remained clear internally and externally and hence the calculated heat transfer for new pipes remains true throughout use. The new tube joint enables cooling of sulphuric acid to be accomplished with complete immunity from joint failures and freedom from any risk of tensile stress being transmitted to the glass from the couplings. Finally, the compact form which this joint permits has been found to result in much more efficient water distribution with consequent reduction in size of cooler.

Simple and Reliable Sulphur Burner Designed by St. Gobain

SOME 10 years ago Cie de Saint-Gobain faced the problem of producing some 500 kg./hr. of SO_2 as a gas containing more than 17% SO_2, by direct combustion of sulphur with air. At that time there was not available a simple and reliable burner, so the company designed one.

Describing the Saint-Gobain sulphur burner to the Stockholm meeting of the International Superphosphate Manufacturers Association, J. M. Lerolle, of the company, said that molten sulphur arrives in a central channel at low speed. The atomisation air, previously heated to optimum temperature, enters a jacket around the sulphur channel and passes through orifices which lead it at high speed and tangentially on to the stream of sulphur, resulting in an emulsion of sulphur and air. This emulsion passes through an orifice and the expansion of the air, intimately mixed with the sulphur, gives rise to the atomisation of the latter in the combustion chamber where secondary air ensures complete combustion of the sulphur.

It is necessary, Lerolle states, to maintain the sulphur at a temperature corresponding to the minimum viscosity of molten sulphur (about 150°C) up to the point where it leaves the burner. If viscosity is not well in control, the sulphur may either plug the orifice or shoot out as filaments.

A steam jacket and adjustment of the temperature of the atomisation air maintains the sulphur at a convenient temperature in the burner. The nose of the burner suffers the severe radiation of the flame. It can be fitted with a steam jacket, or screens can be used to prevent radiation, or the nose can be cooled by secondary air.

Two burners of 250 kg./hr. capacity have been installed in Saint-Gobain plants and are stated to work perfectly. A smaller burner of 100 kg./hr. has been built for a customer who is also satisfied with it.

Results. Lerolle says that with this type of burner gas at 18% SO_2 can be obtained with complete combustion of the sulphur. Flexibility is high as a

burner designed for 250 kg./hr. can deal with 100 to 400 kg./hr.

Sulphur purification is simple; to produce H_2SO_4 from dark sulphur, good filtration is preferable. The amount of atomisation air represents roughly 3 to 4% of the total air, which is compressed to about 300 gr./sq. cm. only.

Larger Burners. For normal sulphuric acid production the company have used larger burners based on the same principle which handles 1 and 2 tons of sulphur per hour and a burner is being made which will handle 3 tons/hr.

A sulphur burner designed to burn H_2S gas, as well as sulphur, has been built also, which is stated to work very satisfactorily.

Big Output Rises Reported by Israeli Fertilizer and Chemicals

PRODUCTION figures of all the plants of Fertilizers and Chemicals Ltd., Haifa, Israel, for the year to 31 March 1959 indicate substantial improvements. Erection of the company's new plants has progressed very well and is ahead of schedule, so that by next summer Israeli farmers will be able to buy their fertilisers in either compound granulated, or compound liquid form. Also despite a reduction in the return per ton for the major products, resulting from a smaller Government subsidy, the company hope to maintain and even increase their margin of profits.

Value of sales at home and abroad, including the products of the Kadimah Chemical Corporation, acquired by Fertilizers and Chemical, amounted to £I22,325,000—a gain of just over 10% over the previous year.

Output in nearly all plants exceeded the figures of the previous year by 10 to 50%. Improvements in equipment and processes raised production in most units to levels "well beyond the capacity for which they were originally designed." Production costs per ton of output continued to decrease, despite higher wages.

The range of fertilisers for the Israeli farmer was expanded further and at the same time the production programme has been diversified by including more industrial chemicals. The share of triple superphosphate (43% P_2O_5) and enriched superphosphate (24% P_2O_5) in the total output of superphosphate rose from 13% in 1957/58 to 40% in 1958/59. New products marketed for the first time during the year were nitric acid, concentrated nitrogenous solution and sodium pyrophosphate.

Acquisition of the Kadimah company has enabled Fertilizers and Chemicals to enter the field of organic chemistry, taking over and expanding the production of detergents. Rights for the Kadimah petrochemical process have also been acquired enabling Fertilizers and Chemicals to make a new type of synthetic detergent and organic by-products.

Engineering Division. This division has nearly completed the plant design for doubling ammonia production and ancillary services and construction is well advanced. The dry ice plant is due to be completed this year and plans for mixed granulated fertiliser and aluminium sulphate (from Negev clay) are in the design stage. Preliminary design has begun on an elemental phosphorus plant to be built in the Negev.

Research. The Research Division has been engaged in developing processes for new liquid and compound fertilisers and a broad range of industrial chemicals. Several new phosphate salts based on local raw materials were developed, and commercial production of these has begun. Research has also been conducted on the manufacture and reactions of elemental phosphorus.

Light's New Laboratory Will Produce Chrystalline Enzymes

A SPECIAL laboratory is now being equipped by L. Light and Co. Ltd., Poyle Estate, Colnbrook, Bucks, to produce crystalline enzymes such as ribonuclease, chymotrypsin, trypsin, peroxidase, and deoxyribonuclease on a pilot scale, and multi-purpose all-glass 100-litre pilot plant has been erected to cope with demands for custom syntheses.

The company has just issued its 1960 catalogue of over 5,000 substances which embrace organic chemicals for syntheses, biochemicals, enzymes and analytical reagents. Particular emphasis has been placed on manufacture of chromatographically pure *laevo*-amino acids and peptides; while rare alkaloids have also received attention.

During the last two years great interest has developed in semiconductor materials; and to satisfy these requirements the firm now offers a wide range of ultra pure (99.999%) elements such as gallium, antimony, arsenic and phosphorus. They also supply very pure inorganic salts such as cesium iodide and metal fluorides for growing single crystals for the optical industry.

Capital Spending at Wilton

During the next year or two capital expenditure at the Wilton Works of I.C.I. will be at the rate of £10 million per annum, and will provide work for another 400 people.

Process Plant for the Chemical Industry by Wiltons, Stockport

IN 'Process Plant for the Chemical Industry,' Chemical Engineering Wiltons Ltd., Cheadle Heath, Stockport (one of the Simon Engineering Group) illustrate some of the many plants they have recently designed and constructed.

In tar derivatives it is stated that plant is currently being installed for the production of phthalic anhydride from naphthalene, using the fixed-bed catalyst technique. Other plants available in this field include tar bases; tar acids extraction; refined tar acids; coumarone and indene resins; naphthalene; anthracene; pitch, and blending.

Alternative processes for extracting benzole from gas streams are offered, including the UCB-Wilton pipestill process and Staatsmijnen plant for continuous acid washing of benzole and toluene. Other work covers by-product and synthetic ammonia, effluent treatment, solvents recovery and Spraypak fillings for distillation and absorption columns.

Rio Tinto (U.K.) Will Manage Thorium Ltd.

RIO TINTO, who with Dow Chemie AG (the Dow Chemical Swiss subsidiary) have jointly acquired the capital of Thorium Ltd. from I.C.I. and Howards and Sons (C.A., 7 November, p. 654), are associated with Dow in Rio Tinto Dow Ltd. This Canadian company came on stream with a thorium plant at Rio Tinto's Algom Quirke mine, Ont, in May 1959, producing crude thorium salts from the treatment of barren liquors from uranium extraction. It is the first of its kind in the world and uses a solvent extraction process.

Rio Tinto Management Services (U.K.) Ltd., 59 Gresham Street, London E.C.2, have assumed the management of Thorium Ltd. Main uses of thorium compounds is for incandescent mantles. Thorium oxide finds increasing use as a refractory for special optical glasses, while it also has applications as a catalyst. Alloys of thorium and magnesium have become important, small quantities of thorium having a marked effect on the properties of the metal. Some thorium compounds are used in analysis.

Obituary

Dr. T. Howard Butler, Ph.D., for many years chairman of William Butler and Co. (Bristol) Ltd., tar, rosin and petroleum distillers, has died, aged 72. Mr. Butler retired in 1952 after nearly 50 years distinguished service with the firm, whose founder was Mr. William Butler, Dr. Howard Butler's grandfather. He was also at one time chairman of the Bristol and West Tar Distillers Ltd., F. Fox and Vowles Ltd., and Allen Davies and Co. Ltd.; he also held directorships of the Midland Tar Distilleries Ltd., and Burts and Harvey Ltd.

CELLULOSE DERIVATIVES SHOW INTERESTING ION-EXCHANGE PROPERTIES, SAYS N.C.L. REPORT

FURTHER progress has been made in the study of the preparation and properties of resorcinal arsonic acid resins by the National Chemical Laboratory. It is stated in the annual report (see also CHEMICAL AGE, 31 October, p. 605) that this type of resin has marked chelating properties for certain metal ions, notably uranium and thorium.

The main effort has been directed towards the preparation of improved resins of high capacity (maximum arsonic acid content) capable of rapid exchange and with a high degree of insolubility. By suitable choice of formaldehyde content, resins with a high degree of swelling and a complementary rapid rate of reaction with metal ions in solution have been prepared. 'Porous' resins have been prepared by effecting the condensation in the presence of a large excess of solid calcium hydroxide with subsequent leaching of the calcium from the resins. In this way a 20-fold overall increase in the rate of uptake of metal ions from solution has been achieved.

Cellulose Derivatives. Certain cellulose derivatives, such as phosphorylated- and aminated-cellulose have been shown to possess interesting ion-exchange and complexing properties. New materials, based on cellulose and other hydroxylated polymers like polyvinyl alcohol, have been prepared in which certain functional groups known to form chelate complexes with metal ions are incorporated in the polymer structure. Of particular interest is the rapid rate of ion-exchange of these new polymeric complexing agents due to their hydrophilic nature.

Hydrazine Polymers

Other Polymers. Hydrazine polymers, polyazines, have been synthesised which are potentially of interest as complexing agents, and work is being done on electron-exchange polymers.

Organoboron Compounds. As organometallic compounds are of very great actual and potential industrial importance; a study of organic compounds of boron has been undertaken. The immediate aim is to provide background knowledge of the chemistry of the boron-nitrogen system and to prepare a range of intermediates from which thermally stable and other useful materials may be made.

Microbiological Research. Five main items are included in the present research programme. These are: the National Collection of Industrial Bacteria; investigation of sulphate-reducing bacteria; investigation of sulphur-oxidising bacteria (Thiobacilli); microbial formation of methane; and advisory work on economic microbiology.

Sulphide From Sewage Sludge. Trials of sulphide production from raw sewage sludge enriched from calcium sulphate on the 50-gallon pilot plant of the L.C.C. Northern Outfall Works, Beckton, E. London, have been completed and have given encouraging results and preparations are now in progress for further trials using a fermenter of 100,000 gall. capacity. Work has now been directed to producing an innocuous final sludge, since this residual sludge still contains 40-60 mg S^{2-}/100 ml. and is offensive. Also the supernatant liquor is black and noisome, and cannot be purified by the activated sludge process. Microbial acidification and aeration processes have been investigated and have proved successful although the acidification process in uneconomic.

Methane Formation. Aims of the present investigation are to isolate organisms which produce methane and to examine their physiology, with the ultimate object of using them more efficiently. Methane production from glycine added to sewage sludge has therefore been investigated, methane production from ethanol added to digested sewage sludge, and methane production from sewage sludge. Ethanol and glycine were attacked slowly during the first two days but then the rate of breakdown increased rapidly. Butyrate was very slowly destroyed. N.C.L. states it seems likely that fatty acids and ethanol do not play a major part in the production of methane during the anaerobic digestion of sewage sludge.

U.K. Firm Now Producing U.S.-designed High-temperature Ammonia Dissociators

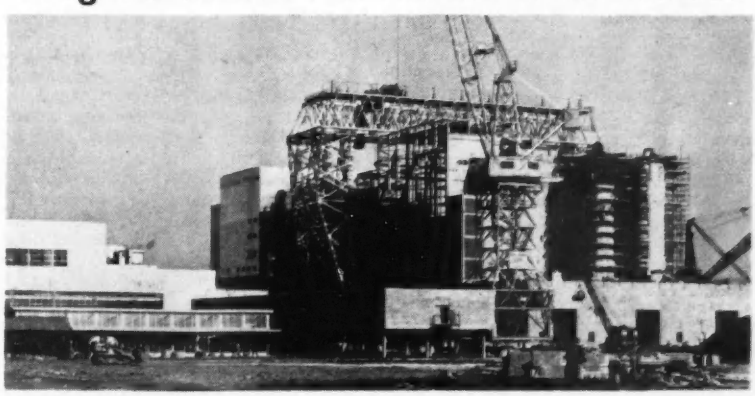
FOR some years the use of 75% hydrogen/25% nitrogen mixtures (derived from cracked ammonia) has grown steadily. More recently the high temperature cracker has increased in popularity as it obviates the necessity of water scrubbing to remove residual ammonia. In consequence, the benefits of the extremely low oxygen and water vapour concentrations obtained in ammonia crackers are maintained, without the high capital cost of additional drying and other purifying equipment.

Using a specially developed catalyst with exceptionally long life and high activity, high temperature ammonia crackers are now being produced by the Gas Atmospheres Division of the Incandescent Heat Co. Ltd., to the design of the Drever Co., Bethayres, U.S. These plants have outputs from 150 to 5,000 s.c.f.h. and are produced in 10 standard sizes.

High-temperature cracked ammonia is used in the heat treatment of metals, sintering, welding, controlled nitriding, degassing of metal parts and in metal cleaning by the sodium hydride process.

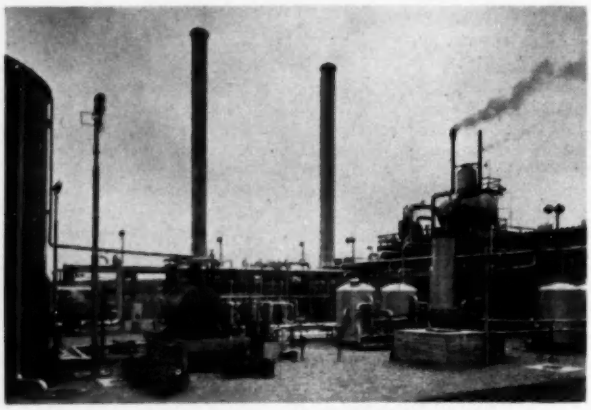
In the chemical industry the gas finds use in the hydrogenation of fats and oils, where the presence of nitrogen has been found to have little effect on reaction rates. No less than six major chemical companies have already installed this process in the U.S. In two of these plants, part of the supply of cracked ammonia is burned to provide nitrogen for purging process plant, thereby making each plant self-supporting and relatively independent of outside services.

Progress at Bradwell Atomic Power Station



Cladding on No. 2 reactor, right, is now completed at the Bradwell nuclear power station. Insulation of the two heat exchangers, extreme right, is also complete and a third heat exchanger (the last of 12 to be delivered by Head Wrightson) has been set up alongside them. The turbine hall is on the left. Building is in the hands of the Nuclear Power Plant Co. Ltd., Knutsford, Ches. (See also Distillates, 24 October, p. 570)

JOHN THOMPSON PLANT AT WHITEGATE REFINERY



Boiler feedwater treatment plant at the Whitegate refinery. Comprising alkaliminator, scrubber tower and sodium cycle base exchange. The equipment, made by John Thompson-Kennicott, has a normal flow of 12,000 gall./hour

THE new oil refinery, which with a capacity of 2 million tons crude oil a year has been built for the Irish Refining Co. at Whitegate, 23 miles from Cork, comprises a crude oil distillation unit, a copper sweetening plant, a gas hydrofiner and a catalytic reformer. Building on the £12 million project started in the autumn 1957 and the plant has the distinction of being the first entirely air-cooled refinery in Europe.

Steam for process work, for steam tracing the oil pipelines, and for domestic heating, is provided by three type 65.S. water tube package boilers that were supplied by John Thompson Water Tube Boilers Co., Wolverhampton. Each Whitegate boiler has an evaporation of 32,000 lb./hr. and is fitted with an economiser and superheater from which the final steam temperature is 450°F. Working at a pressure of 150 p.s.i.g. and with feedwater temperature at 250°F, the boiler is designed for either oil or gas firing and is capable of a 4-hour peak load at 34,500 lb./hr.

Drainable Superheaters

One John Thompson horizontal type uncontrolled drainable superheater, with a single pass on the steam and gas sides and giving a final temperature of 450°F ±10°F, is associated with each boiler. Effective heating surface of the superheater whose tubes are of 1¼ in. diameter 9 gauge mild steel, is 140 sq. ft.

Boiler feedwater is treated by John Thompson-Kennicott water treatment plant having a normal flow of 12,000 gall. an hour. This equipment consists of alkaliminator, scrubber tower, and sodium base exchange.

For the conversion of temporary hardness into carbonic acid, the water passes through a bed of special resin to the scrubber tower, which has an opposing (upward) flow of air. This air scrubs away CO_2 from the water, which finally passes through the sodium cycle base exchange section for the removal of the remaining permanent hardness.

This type of plant produces a water having zero hardness and an alkalinity of approximately 10 p.p.m., introduced by the addition of a small quantity of caustic soda before the water reaches the base exchange section of the plant. In this manner, CO_2 remaining after scrubbing is neutralised and the pH is raised to eight. The temporary hardness removal unit (alkaliminator) is regenerated with sulphuric acid and the base exchange unit with salt solution.

To remove the dissolved oxygen from the boiler feedwater a John Thompson-Kennicott pressure type deaerator, operating at 15 p.s.i.g. and at 250°F, is used. With a capacity of 132,000 lb./hour, the deaerator removes the dissolved oxygen to below 0.005 cc./litre.

For injecting sodium sulphite solution into the feed-water system so as to maintain the desired sulphite residual in the boilers, the John Thompson-Kennicott plant includes a tank and a pump. Similar equipment is installed for adding phosphate solution to the required level in the boiler water.

The Lummus Co. Ltd., 80 Regent Street, London, were the main contractors for the steam raising plant.

1960 Symposium on Powders in Industry

SURFACE Activity Group of the Society of Chemical Industry is holding an international symposium on powders in industry on 29 and 30 September, 1960, at the Royal Institution, London. Chairman of the group is Sir Eric Rideal, M.B.E., and chairman of the organising committee is Dr. M. G. Fleming, of the Bessemer Laboratory, Imperial College of Science and Technology.

Aim of the meeting is to bring together representatives of the industries in which fine powders are of importance, whether as raw material, an intermediate processing stage, or final product, and provide opportunity for discussing mutual problems.

Preliminary programme and further information may be obtained from the hon. secretary of the group, the Society of Chemical Industry, 14 Belgrave Square, London S.W.1.

Industrial Safety Makers' Association Formed

IN RECOGNITION of the need for further efforts in the campaign against industrial accidents, many leading manufacturers of safety equipment have formed the Industrial Safety (Personal Equipment) Manufacturers' Association, formal inauguration of which took place on 2 October 1959.

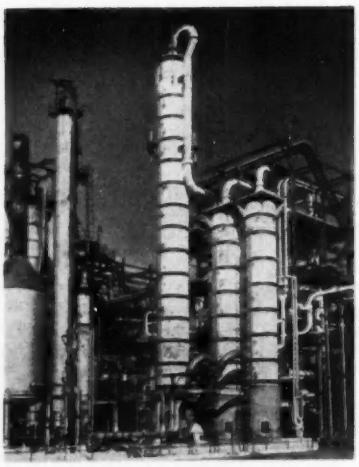
Intention of the association is to organise constant analysis and study of materials, and design and manufacture techniques in such equipment, with a view to improving standards of effectiveness against existing hazards as also against those involved in new processes under development.

The association hopes to work in close association with Government departments, trade unions, medical authorities and safety organisers to further exchange of latest information.

I.C.I. Makes Britain's First Isodecanol

ISODECANOL, a mixture of branched-chain primary alcohols which is esterified with phthalic anhydride to produce the plasticiser DIDP (di-isodecyl phthalate), has now been added to the sales range of carbonylation alcohols manufactured by the Heavy Organic Chemicals Division of I.C.I. on Tees-side. This represents the first commercial production of isodecanol in Britain. The plasticiser gives enhanced properties to p.v.c. products such as electrical cable and calendered film.

Among the important characteristics so far established for DIDP, such as good low-temperature and electrical properties



View of the carbonylation alcohol plant operated by I.C.I.'s Heavy Organic Chemicals Division at Billingham

and low density, its high permanence on thermal ageing is particularly notable. In a typical composition containing 33% by weight of plasticiser, the loss in weight of DIDP on heating for 24 hours at 100°C was only 0.3% (DOP 0.5%) and, for 350 hours at 100°C, only 3.8% (DOP 17.4%).

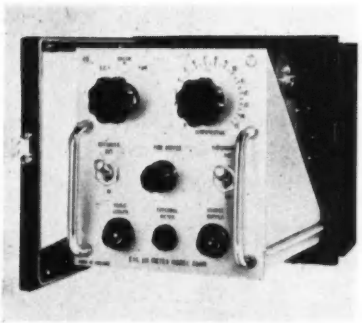
EQUIPMENT NEWS

Chemical Plant : Laboratory Equipment : Control and Indicating Apparatus

K.D. GRANULAR SILICA GEL DESICCATORS FULL protection from climatic conditions for laboratory equipment and instruments can, it is said, be provided simply and cheaply by the use of K.D. desiccators, which use granular silica gel as the desiccant. A special feature of the K.D. desiccator is a built-in indicator which shows immediately when the desiccator requires regeneration and when regeneration has been completed. The granular silica gel desiccant, unlike calcium chloride, is claimed to remain solid when saturated with water. It is non-toxic, odourless, non-corrosive and can be regenerated without limit by heating in an oven for about an hour.

Capacity of the standard K.D. unit is sufficient to maintain dry conditions in an enclosed space of up to 5 cu. ft. for reasonable periods. The K.D. unit will absorb up to 2 oz. of water from the surrounding atmosphere before regeneration is required. They are available from **K.D. Ltd.,** 5 Grosvenor Gardens, London S.W.1.

MINIATURISED pH METER



Complexity of modern instrumentation has led Electronic Instruments Ltd., Lower Mortlake Road, Richmond, Surrey, to develop a miniaturised pH meter occupying some 60% less panel area than the firm's standard industrial instrument. Identical performance with the standard meter is claimed for the miniaturised pH, and servicing may be carried out simply by opening the glass-fronted door and withdrawing the chassis complete

TRIPLE-PURPOSE PUMP SPECIALLY designed for use in research, medical and industrial laboratories, the D.A.G. range of triple-purpose submersible pumps operate from a standard five-amp. lamp socket, are almost silent, and are adaptable for mixing, pumping and circulating. Models seen under test were the Mark I, weighing some 6 lb. capable of transferring 400 gall./hr., and the slightly larger Mark II, which achieves a flow rate of 600 gall./hr.

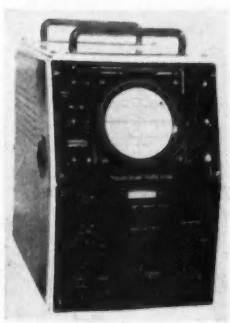
Finely machined and of robust and simple design, the pumps would appear to live up to the manufacturer's high expectations. Both models are a.c./d.c. single phase, with voltage ranges 100/110, 200/220, and 230/250.

We understand that enquiries have already been received from a number of local authorities, university laboratories and factories, to whom the pumps have been despatched for a free trial period. **D. A. Gunn (Engineering) Ltd.,** 32 Park Road North, London W.3, report that to date no user has returned the equipment, although several have placed orders.

DICKOW PUMPS FOR LIQUIDS AND SLUDGES DICKOW pumps, to be made under licence by **Firth Cleveland Pumps Ltd.,** Stornoway House, Cleveland Row, London S.W.1, can handle a wide variety of liquids and sludges at temperatures up to 250°C (482°F). Chemicals for which the pumps are used include: alcohol, acetic acid, glycerine, lithium chloride, caustic soda, crude heavy benzol, sulphuric acid, brine, nitric acid and carbon tetrachloride. Pumps can be ordered with any number of stages up to and including eight stages. Each stage develops a head of 100 ft. at 1,450 r.p.m., normal operating speed. The eight stage pump therefore develops 800 ft. The capacity of the pumps ranges from 25 to 1,000 g.p.m. Efficiency of the pump is stated to be 82%. The priming stage (of the regenerative type), is mounted after the pumping stages. This arrangement, believed to be exclusive to these pumps, ensures that no vapour-lock can occur in the pumping stages. This in turn eliminates the need for constant supervision of the pump.

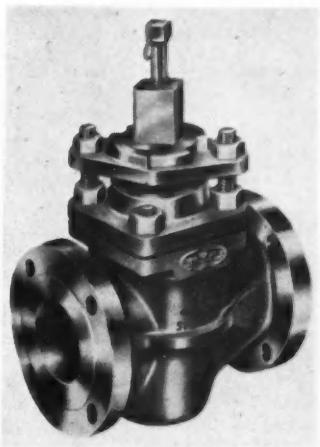
CZECH KOVO P.576 POLAROSCOPE THE Kovo P.576 polaroscope, designed at Professor Heyrovsky's Polarographic Research Institute, Prague, and available from the sole U.K. agents, **Nash and Thompson Ltd.,** Hook Rise, Tolworth, Surrey, is an oscilloscope specially adapted to polarographic analysis. The method is based on the principle of an electrode system through which is allowed to pass an a.c. of 50 c.p.s. from a 300V power supply of high internal resistance; the polarisable electrodes is charged during one cycle of the a.c. within a potential range from 0 to −2V, and then back again from −2V to 0 (depending on solution composition).

The instrument is suitable for analysis in the range 10^{-3} to 5 by 10^{-5}M. Concentrations down to 10^{-9}M can be reached by electrolytic concentration (turning the 'micro' switch on the instrument) or by a hanging drop method. Comparative titrations can be performed by using twin electrode systems and observing two oscillograms displaced horizontally. Titrant is added until the depth of incisions coincide. Isomers and compounds of similar structure can be very easily examined and identified.



Kovo P.576 polaroscope designed in Prague

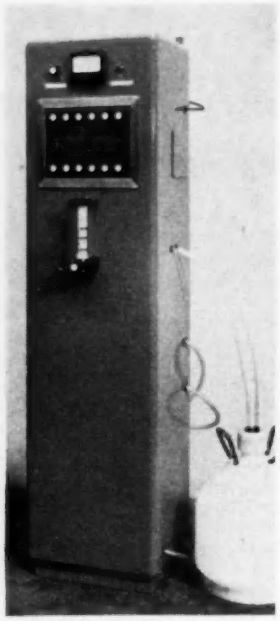
TRIANGLE LUBRICATED PLUG VALVES AN ADDITION to the range of the **Triangle Valve Co. Ltd.** (P.O. Box 38, Lamberhead Green, Wigan, Lancs) is the cast steel '150 Series', lubricated plug valve,



Cast-steel lubricated plug valve

marketed in sizes from 1½ to 6 in. Body, cover, gland and stop are cast in carbon steel to B.S. 1504-161, Grade B. Packing is of rubberised cotton fabric, gasket of asbestos fibre and diaphragm in stainless steel. The grease plugs fitted are said to be interchangeable with other leading makes. The valve incorporates design features which eliminate sticking after prolonged periods of inactivity.

DEMINERALISE YOUR OWN WATER TO ENABLE manufacturers to demineralise water to their own requirements the **Permutit Co. Ltd., London,** are marketing their 'Deminrolit' plant, a mixed-bed appara-



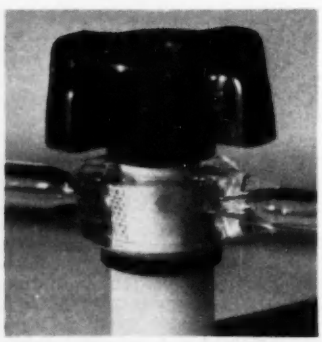
Permutit Deminrolit plant

tus for which high economy is claimed.

The single, steel verticle cyclinder, housed in a handsome enamelled steel cabinet, contains intimately mixed cation and anion exchange resins, eliminating both heat and power for operation.

Equipped with multi-valve control panel, conductivity tester, motorised air blower, and flexible connection and delivery tubes of polythene material, the unit is said to produce purified mains water with a conductivity of less than 1 reciprocal megohm per cm.[3] Maker's address is Permutit House, Gunnersbury Avenue, Chiswick, London, W.4.

LOUGHBOROUGH STOPCOCK IN P.T.F.E. REVOLUTIONARY design is claimed for a Watson-Marlow p.t.f.e. and glass stopcock from the **Loughborough Glass Co. Ltd.**, of Leicestershire, details of which have recently been released. The p.t.f.e. key needs no grease and is said to be seize-proof in presence of caustics; while the stopcock is easily assembled into standard equipment, with its barrel and side arms of Pyrex glass. Suitable for medium



Stopcock in p.t.f.e. and glass

vacuum work, the surface of the key has dimples which deform when the retaining cap is tightened; and the barrel is of robust design. Contamination danger is eliminated by the inert nature of the materials of construction.

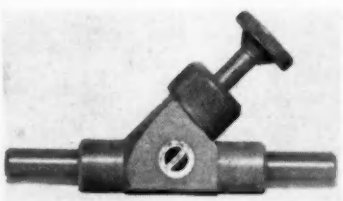
ALL-METAL LABORATORY FURNITURE THE NEW **Griffin-Grundy** all-metal laboratory furniture will be shown at the Building Exhibition, Olympia (18 November-2 December), by **Griffin and George (Laboratory Construction) Ltd.**, Ealing Road, Alperton, Wembley, for the first time.

The new furniture has been designed to provide improved laboratory metal furniture at a lower price than has been possible, and to be packed easily and economically in knocked-down form for export. The furniture is fire-resistant and has improved corrosion resistance. It is of rigid construction; doors, catches and other close-mating parts are already assembled in frames so that the final assembly may be carried out by semi-skilled labour easily and quickly.

There are no projecting handles on cupboards and doors. Instead a continuous flange offers a finger grip space over the full width of the door and drawer, thus ensuring a clean and flush appearance.

The furniture is made from zinc-coated steel sheet for general use, but is available, at increased prices, in aluminium or stainless steel without alteration to the design, or in Stelvetite plastics-coated steel. The finish to the zinc-coated steel is melamine-base stoving enamel. All units have adjustable feet for quick levelling.

ANGLE-SEAT VALVE

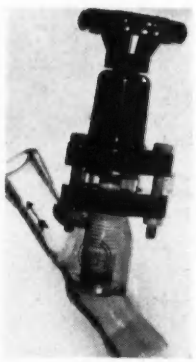


This angle-seat free-flow valve is an addition to the range of all-plastic valves manufactured by Barflo Ltd., 56 Cavendish Place, Eastbourne. It can be made from several types of plastics materials in sizes from ¼-in. B.S.P.

PLASTICS PLUG-VALVES AGENCY TELESCOPIC plug valves of p.v.c. from the firm of Albert Stübbe, now handled under agency agreement by **Goodburn Plastics Ltd.**, Arundel Road, Trading Estate, Uxbridge, Middlesex, are said to be suitable for a wide range of applications at temperatures up to 140°C. Of high-density polythene and polycarbonate, the valves embody a positive shut-off action, using a soft-rubber cup which is forced to the bottom of the passage and then compressed by means of a handwheel. There is no packing gland in the design, and the valves are said to be some six times lighter than cast iron; equally suitable for installation in metal or plastics pipe stems.

LONDEX LEVEL SWITCH A NEW hopper level switch replacing the previous model is offered by **Londex Ltd.**, Anerley Road, London S.E.20, at a price some 50% lower than that charged for the model it replaces. The new switch is said to retain the robust qualities associated with its predecessor, while mechanism has been simplified and appearance improved. The price reduction has been made possible in part by the greater demand envisaged for the new model. Typical uses of the switch include level indication and automatic control of elevating and conveying machinery, emergency shut-off and link-up to centralised control.

Q.V.F. GLASS VALVE



New screw-type 1 in. glass valve for corrosive liquids features Fluon bellows, eliminating packed gland: made by Q.V.F. Ltd., Duke Street, Fenton, Stoke-on-Trent

AIR TURBINES FOR GRINDING AND MILLING THE Turbodyne range has been developed by **Turbomachines Ltd.**, Station Road, Dorking, Surrey, to meet a demand for a relatively high-speed air motor more powerful than the small air turbines generally available. A novel type of rotor used is simple and strong and makes use of a standard governor possible. There is a safety device as a final protection against overspeed.

The units are cylindrical with a rectangular base plate and three alternative shaft ends—1, integral collet; 2, interchangeable collets, 3, a prallel keyed shaft. Each alternative is available with clockwise or anti-clockwise rotation. Four units are available, with power outputs from 0.5 to 1.9 h.p. at 25,000 r.p.m.

HOLMES-ROTHEMUHLE DEDUSTER A RECENT addition to the range of dust collection and control plant manufactured by the Gas Cleaning Division of **W. C. Holmes and Co. Ltd.** is the type 'UK' reverse flow Holmes-Rothemuhle multi-cell cyclone dust collector, claimed to

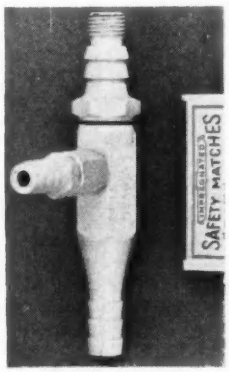
possess a higher collection efficiency than the type 'RM' through-pass collector introduced into the U.K. in 1957.

The collector comprises an assembly of cyclone cells, the number of which is directly proportional to the volume of gas to be cleaned, each cell consisting of two concentric tubes, an outer dirty-gas cylinder with a stationary impeller fixed at the inlet, and an inner clean-gas tube which passes up through the centre of the impeller. The outer cylinder is approximately 10 in. in diameter, except at the conical base; and the separating efficiency is derived from the relatively small diameter of the individual cyclone cells.

In operation, reversal of direction of flow causes the dust to be centrifuged and it is propelled downwards into the dust bunker. Further details are obtainable from the firm's Gas Cleaning Division, P.O. Box B7, Tunbridge, Huddersfield.

SPEEDIVAC WATER-JET PUMP

A NEW Speedivac water-jet pump which will replace all the firm's previous metal pumps has now been introduced by **Edwards High Vacuum Ltd.**, Manor Royal, Crawley, Sussex. The new model



Water-jet pump

is only 4½ in. in length and incorporates a specially designed stainless steel jet, enabling the pump to give maximum performance even with low water pressures. An integral non-return valve prevents water suck-back into the vacuum system, and two alternative balls are provided, rubber for normal use and a plastics version for use with chemical vapours.

ANDERMAN VARIABLE-SPEED STIRRER

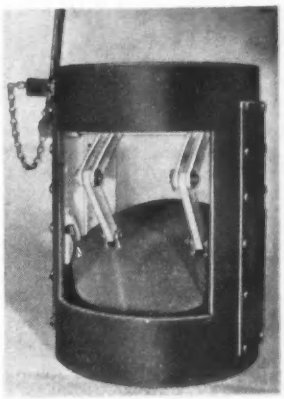
FREE TRIAL of the latest model of the **Anderman and Co. Ltd.** variable-speed stirrer is recommended by the manufacturer's, who are of the opinion that the apparatus needs to be tested to be fully appreciated. Among the special features of the stirrer, supplied with or without gear, are said to be speed stability under varying load, ball-bearing races at each end of shaft, and high torque at low revolutions. Design is claimed to be unique in that the volts on the armature are controlled by an autotransformer with multiple tappings, while field windings are supplied with a constant high voltage. The new model is offered at the same price as the variable-speed stirrer marketed by the firm during the past five years. Details from the makers, Battlebridge House, 87-95 Tooley Street, London S.E.1.

VISCO AIR FILTERS

EFFICIENCY of plus 98% by weight is claimed for the new dry-type air filter by **Visco Engineering Co. Ltd.**, when tested with Aloxite 50 in accordance with B.S.S. 2831. The firm, whose address is Stafford Road, Croydon, Surrey, produce units designed to deal with up to 1,000 c.f.m., at which volume initial resistance is described as 0.22 in. w.g. Throw-away filter-pads are made from a synthetic fibrous material which has been successfully tested for air-filtration efficiency. The unit measures 20 in. by 20 in. by 14½ in.

NEW VENTSEAL VALVE

VARIOUS applications in the chemical field are envisaged by **Charlton, Weddle and Co. Ltd.**, for the firm's Ventseal valve, a new product relating to the patent under that title. In particular the valve may be applied to sealing off gases in furnace



Charlton, Weddle's Ventseal valve

work, and to mechanical ventilating of air inlets, of special significance underground as a fire precaution allowing rapid closure of air feed and draught sources.

Described as having received Ministry of Transport and Civil Aviation approval, the valve incorporates a resilient sealing ring mating with a flanged lip around the interior of the ventilating shaft. It is claimed to be suitable for nuclear plants as well as for refinery installations and ships. Address of the manufacturers is Manor Works, Newcastle, 1.

N.B.A. Review of Benzole Technology

TECHNICAL literature on benzole and allied products published during 1958 is contained in the latest issue of the *Annual Review of Benzole Technology 1958*, published by the National Benzole and Allied Products Association (N.B.A.). During the year under review a punched-card system for the recording of abstracts was put into operation in the technical information section at Watford and the opportunity has been taken to classify the abstracts in a more logical order. As a result, some changes have been made in the arrangement of the contents of the review.

Main alterations noticed include a new section on the interconversion of aromatic hydrocarbons, and the transfer of physical methods of testing from the section on analytical methods to that on properties. Section 8 now combines information on uses of benzole both for motor fuel and industrial purposes; the latter is subdivided according to the constituents of crude benzole rather than to the ultimate products. These new arrangements should increase the utility of the review to readers.

Copies of the 1958 review may be obtained from N.B.A., 132-135 Sloane Street, London S.W.1, at a cost of £1 2s 6d, post free.

The N.B.A. draws attention to the possibility of obtaining further details of literature references on any particular subject within the scope of the review from the Technical Information Service. Photo copies of articles from journals can be supplied. Enquiries can be addressed to the Librarian, Benzole Producers Ltd., Otterspool Way, Watford Bypass, Watford, Herts.

B.D.H. 'Ion Exchange Resins'

Now available from B.D.H. Laboratory Chemicals Division, British Drug Houses Ltd., Poole, Dorset, is the fourth edition of the B.D.H. booklet *Ion Exchange Resins*.

Since the publication of the last edition of this booklet many new and improved resins have become available and consequently some of the older type materials have been withdrawn. This new edition has been completely revised and contains full details of all resins in the Amberlite and Permutit ranges. Tables give details of the physical properties of the various types. The section on applications has been revised and extended and now includes details of some of the newer advances in resin technology, e.g. preparation of 'selective' resins, ion-exchange chromatography, ion exclusion, and applications of ion-exchange membranes.

Included in the book is a table listing the potential and recommended applications of the various resins, a bibliography of books and review papers for reference and further reading, and a subject index.

B.R.R.A. Chairman Seeks Closer Liaison With Industry

SPEAKING of the possible amalgamation between the British Rayon Research Association and the British Cotton Industry Research Association, Mr. I. C. Hill, B.R.R.A. chairman at the annual meeting last week, said that "there would clearly be no gain to the industry unless the fusion was a happy one of two fine teams with a sound blending of research programmes."

Speaking on the need of increasing the ease of getting results into industry, Mr. Hill suggested that it would be desirable if either individual firms or groups of firms would employ one or more technically qualified men to co-operate with the research associations so that there would be a means of converting research information into practical processing information, and also a means of conveying problems from firms into research associations.

It might also be advisable to consider seconding members of the staffs of research associations to industrial firms for periods of a few months or possibly even a year or two, so that the scientific staffs of research associations could have a better understanding of the ways and of the outlook of commercial organisations. This might, of course, involve the risk of a research association losing its scientists to individual firms, but the net result must be a gain for the industry served.

Mr. L. A. Wiseman, B.Sc., A.R.I.C., director of research, said that practically the whole of the effort available in the finishing section had been concentrated on a study of ways achieving minimum-care finishes for continuous filament fabrics.

At the end of last year, the oil spotting agent BRRASK A.Y. was marketed by normal commercial methods. This has had a steady sale of round about 250 gall. per month and it would appear that the preparation proved relatively trouble-free in use since the number of queries from members had been very few.

So far as basic research is concerned, the annual report refers to completed work, which includes alkaline degradation of cellulose. This project was aimed at clarifying the chemistry of the hot alkali refining of cellulose as it was believed that the efficiency of the process could be materially improved. A mechanism for the reactions had been proposed and isolation and confirmation of structure of the intermediate, a dicarbonyl compound, had provided strong evidence that the mechanism is correct. The intermediate, under hot alkali refining conditions, gave the same products as cellulose and showed the required reaction in the presence of calcium ions.

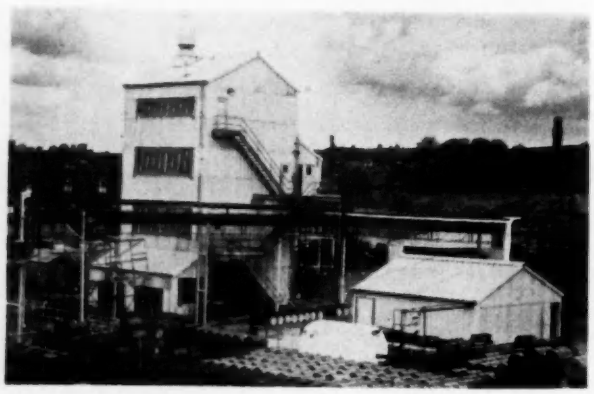
At one stage in the work on the alkaline degradation of cellulose it was believed that calcium ions catalysed one of the reactions, the 'stopping' reaction. If this had been true, it might still have been possible to increase the efficiency of the refining process. The effect of calcium ions on the alkaline degradation of glucose was, therefore, studied.

"It now appears that calcium ions determine the nature of the saccharinic acids formed and the fraction of acids of lower carbon content formed by break-up of the molecule. These conclusions are in agreement with the result reported above, i.e. that calcium ions affect the action of alkali on the intermediate but not the reactions leading to the intermediate," states the report.

I.P.C.A. Annual Dinner

Annual dinner of the Industrial Pest Control Association will be held at the Trocadero Restaurant, London W.1, on 17 November at 7 p.m. for 7.30 p.m. Toast of the association will be proposed by Colonel H. J. Wilson, vice-president, National Farmers Union, and will be replied to by Dr. D. J. S. Hartt, association president. Mr. G. A. Campbell, vice-president, will propose the toast of the guests and Dr. R. I. Milne, Coroner for the Northern District County of London, will respond.

New Alkylene Oxide Derivatives Plant of Lankro Chemicals



The new alkylene oxide derivatives plant of Lankro Chemicals Ltd. at Bentcliffe Works, Eccles, Manchester. This view of the plant was inadvertently omitted from an illustration that appeared in C.A., 26 September, p. 400, which showed only part of the raw materials tank farm

I.C.I. Insecticide Plant Opened in Ghana

AN insecticide plant with a capacity of 500,000 gall. a year of P.P. Kumakate to destroy the capsid bug on cocoa was opened at Tema, Ghana, on 5 November, by Dr. Kwame Nkrumah, Prime Minister of Ghana. This is I.C.I.'s first insecticide factory in West Africa and the product will be sold formulated ready for spraying. The product has been made by I.C.I. in the U.K. and elsewhere for a number of years. It is a gamma B.H.C. insecticide and is marketed in this country as Gammelin.

In deciding to locate the new plant in Ghana, I.C.I. followed their customary policy of developing local manufacture in the country of sale. By manufacturing in Ghana, transport and packaging costs are reduced, resulting in lower prices to the customer.

The Ghana Government, which called on the assistance of I.C.I. and their subsidiary, Plant Protection Ltd., in 1954, are to spray some 2½ million acres of cocoa trees during the next three years. The operation will require a minimum of 700,000 gall. of the insecticide.

In Parliament

Dounreay Reactor Trials

Chemical engineering rather than nuclear problems were the cause of certain difficulties in the fast reactor commissioning trials which have been taking place at Dounreay—stated Sir David Eccles in response to a question in the House of Commons recently. Enriched uranium is in process of loading, it was further explained, and is expected to reach a critical state within the next few weeks.

It will be recalled that the reactor is an experiment in development of fast breeder systems, and successful exploitation in future will depend upon results obtained from such trials.

Monopolies Report on Fertilisers Due Next Year

Report of the Monopolies Commission on fertilisers, laid before Parliament on 24 July, is now being prepared for publication, said Mr. R. Maudling, President, Board of Trade, in the House of Commons last week. He hoped that it would be published early in 1960.

Temporary Import Duty Exemption for Some Chemicals

Certain chemical and other products listed in the Customs and Excise Tariff under headings in chapters 28, 29, 30, 38, 39, 70, 73, 81, 85 and 90, have from 9 November been temporarily exempted from import duty under the Import Duties (Temporary Exemptions) (No. 10) Order, 1959. The order consolidates all current temporary exemptions and provides for certain additional chemicals to be exempted from the duty. The period of exemption for the new items is until 1 October 1960, unless a shorter period is indicated.

Overseas News

WEST GERMAN PHARMACEUTICALS OUTPUT ROSE BY ONLY 4% IN FIRST HALF OF 1959

TOTAL production value of pharmaceutical chemicals produced in Western Germany in the first half of the current year (excluding West Berlin) was DM.887,500,000 (against £73,125,000). This represents an increase of 4% on the first half of last year, although as the increase over the previous twelve-month period was one of 13.5% this cannot be seen to be a very progressive increase. Including West Berlin, production value in the six-month period was DM 973,000,000, or about £81,100,000. Exports rose more sharply, however, and in the face of tightened international competition. From January to June of this year some DM 234,000,000, or £19,500,000, was exported from the entire Federal Republic—8.4% more than in the same period of 1958. The hitherto steady rise of pharmaceutical imports into the country at last seems to have stopped, and the figure of DM 62,000,000, or £5,167,000, for the half-year is no higher than that for the first half of 1958. This is due mainly to the start of German production of serum and vaccine. An interesting fact is that the members of the Other Seven bloc are better customers than Germany's Common Market neighbours. Best customers are, in this order, Italy (Common Market), Switzerland (Other Seven) and Austria (Other Seven). Total Europe exports increased by only 7% over the 1958 period, while Asian sales rose by 10%.

Methylamines from Du Pont

Methylamines are to be produced by E. I. du Pont de Nemours and Co. in a new plant to be completed in the spring of 1961, at the company's Belle, W.Va., site. At this location methanol and ammonia are available and the new plant, it is stated, will more than double the company's production capacity for methylamines, currently being produced at du Pont's Houston, Texas, plant.

Besides dimethylamine, the new unit will produce dimethyl formamide and dimethylacetamide—a new polar solvent.

Foret to Produce Alkaline Silicate in Valencia

A 3,700-ton-per-month production of alkaline silicates is envisaged from the new furnace erected in their Valencia factory by Foret S.A. The installation was carried out with French technical assistance.

Montecatini Double U.S. Polypropylene Capacity

Novamont, Montecatini's U.S. subsidiary, have announced that they will more than double the capacity of their Neal, W.Va., plant (still on the drawing boards)—from 11 million lb. to some 25 million lb. a year. News of the plant was released less than four months ago.

The company considers that the polypropylene market looks even more promising than it did then for plastics, films and fibres. Construction start-up (scheduled for November) will not be delayed. The unit is due to go on stream early in 1961. It will employ about 200 people.

Increased Methylamine Production by Commercial Solvents

Production of mono-, di-, and trimethylamines from methanol at their Terre Haute, Ind., plant is being increased by Commercial Solvents Inc., U.S. The company is stepping up its methanol production by process adjustments and installing new equipment at its Sterlington, La., plant.

Japanese Company to make Polycarbonates

Next commercial polycarbonate producer will be a Japanese company. The new Teijin Chemical company expects to be on stream with a $2.3 million, 5 ton/day plant at Hiroshima, before General Electric and Mohay in the U.S.

Large Oil Combine for East Germany

Figures issued this week from East Berlin show that the total cost of the oil combine and petrochemical plant to be built at Schwedt in the East German republic will be in the region of 1,200 million Eastmarks, or taking a 1:1 East-West exchange, some £100 million. Apart from usual petrochemical products, a large-scale set of plants for the production of oxygen will be installed.

Union Carbide-Petrochim Polythene Plant for Antwerp

The foundation stone has now been laid in the port district of Antwerp of a petrochemical plant to be operated by the Belgian company Cobenam S.A., of Antwerp, a 50-50 joint subsidiary of the Belgian company Petrochim S.A. and the Union Carbide Corporation of New York. The plant, which will be brought on stream in 1961, will have an annual capacity of 15,000 tonnes of high-pressure polythene.

More Details of Indian Urea Plant

It is claimed that the Indian urea plant to be erected by Montecatini and Ansaldo (see CHEMICAL AGE, 7 November 1959, p. 651) will be first in the world to transform the whole of the ammonia production into urea without by-products.

The plant will be erected for State-controlled Neyveli Lignite Corporation Private Ltd., at Neyveli, some 90 miles from Madras. In the vicinity is an extensive lignite bed said to be capable of supplying about 500,000 tons of raw material a year.

The project will comprise a plant for mining the lignite; another for its drying and gasification and further plant for fractioning of air and gas. There will also be machinery for synthesis of 300 tons daily of anhydrous ammonia, and for synthesis of urea at the rate of about 160,000 tons a year; together with a variety of ancillary equipment.

New Plastics Research Unit for Royal Dutch/Shell

Royal Dutch/Shell have now officially opened a new plastics laboratory at Delft, near The Hague, Holland. Scientific and technical research, covering a wide variety of plastics and synthetic rubbers, is carried on by a staff of 150.

B.A.S.F. Demonstrate Toughness of Polycarbonates

Maleable (almost) as iron it can be made into nails. Potentialities of polycarbonates in the 'Makrolon' formula from Farbenfabriken Bayer were demonstrated at the recent Düsseldorf Exhibition (see C.A., 7 November, p. 643). Said to have extremely good impact resistance, it can be smithied 'to some extent'

Merck Sharp in Siam

The State Board of Investment of Siam announces from Bangkok that it has granted the Merck, Sharp and Dohme, the U.S. pharmaceuticals concern, permision to erect a production plant in Siam. Permission is needed from the board by foreign companies intending to make capital investments in Siam.

Coal Chemicals in Nigeria ?

Nigeria may well become the home of a thriving coal-based chemical industry, it is announced by the general

manager of the Nigerian Coal Corporation. Recent experiments are said to have shown that coal from the Corporation's Enugu field could be converted into coke on a commercial scale at an economic cost. The country would then be in a position to build up a host of dependent industries, including the manufacture of chemicals, fertilisers and tar products.

World Largest Water Electrolysis Plant

A water electrolysis unit said to be the largest in the world is to be installed at the nitrogenous fertiliser plant being built at Aswan, in the United Arab Republic. The unit has been ordered from the West German plant manufacturer Demag-Elektrometallurgie by the Ludwigshafen-on-Rhine firm of Badische Anilin- und Soda-Fabrik AG, which is concerned with the planning of the plant. The order refers to a total of 288 electrolysers with a combined hourly capacity of 35,000 c.m.

Stauffers New Process for Insecticide Intermediate

Now building a new $500,000 plant at Henderson, Nevada, U.S., are Stauffer Chemical Co. The plant will produce *p*-chlorothiophenol, primary intermediate for Stauffers' organic phosphate insecticide, trithion, by a 'radically' new process, it is reported. The company, in the meantime, will continue to manufacture the intermediate at their Niagara Falls, N.Y. plant until the new plant is on stream.

Although process details have not been disclosed, it is believed that Stauffer use a variation of the classical route: chlorosulphonation of chlorobenzene to chlorobenzene sulphonyl chloride, followed by reduction to the thiol. The detailed manufacturing process for trithion has also not been revealed, although main steps are outlined in patents. Essentially synthesis of trithion is as follows: intermediate *p*-chlorothiophenol reacts with formaldehyde and anhydrous hydrochloric acid to yield *p*-chlorophenylchloromethyl sulphide. This is then reacted with sodium diethyl dithiophosphate to give trithion.

Firestone in France

Firestone Tire and Rubber Co. plans to build a plant for the production of synthetic rubber "somewhere in France". Although no site has been fixed as yet, it is expected to be in the region of Bordeaux. A tyre plant will be built on the same premises as the synthetic rubber factory.

Pemex Plan Petrochemical, Fertiliser and TEL Plants

Petroleos Mexicanos have announced that they plan to set up butadiene, styrene and copolymerisation plants in Tampico, Tamaulipas. Construction of these petrochemical plants will absorb an investment of more than 200 million pesos.

Pemex also state that, in addition, a tetraethyl lead plant will be erected at Tampico, and that studies are under way on a dodecylbenzine plant.

The President of Mexico announced recently that Pemex would invest 600 million pesos in 1960 in the building of fertiliser plants in Minatitlan, Salamanca, Tampico and Sonora, and also referred to the regulation that will govern the petrochemical industry, saying that a perfectly clear line has been drawn between the areas of government and private enterprise. He added that the Mexican Government has not collected taxes from Petrolos Mexicanos since November 1958 so as to permit the company to accumulate sufficient resources for the initial development of the Mexican petrochemical industry.

Lever Brothers Plan Detergent Plant for S. Rhodesia

Erection of plant costing some £250,000 for the production of non-soapy detergents is now under way by Lever Brothers (Rhodesia) (Pvt.) Ltd.

Poland's Chemical Investments

The Bank of Investment of Poland has recommended that Government investments in 1960 should be reduced to zloty 2,200 million. The chemical industry still holds pride of place in the investment programme, however, with a sum of zloty 400 million to be spent on it next year.

Pittsburg Coke to Build Maleic Anhydride Plant

Approval of plans to build a new 20 million lb. a year maleic anhydride plant are announced by Pittsburgh Coke and Chemical Co., U.S. Construction is to begin shortly at Neville Island, near Pittsburg.

Fertiliser Plant for Ceylon

Director of the Bureau of Industry, the Ceylonese Ministry of Industry and Fishery, Mr. E. C. Paul, has arrived at Tokyo at the invitation of the Japanese Government, it is reported. During his stay Mr. Paul is to have talks with Japanese Government officials on the possibility of Japanese financial co-operation in Ceylon's plan to construct a chemical fertiliser plant at a cost of Rs.100 million. Ceylon is planning to build a plant capable of producing 200,000 tons of ammonium sulphate annually.

Air Liquide to Build Yugoslav Gas Separation Plant

Air Liquide Manufacturing, affiliated to Canadian Liquid Air Co., Montreal, have been awarded a contract worth $1.6 million to build a low-temperature gas separation plant for the Yugoslav Government.

U.S.-German Catalyst Company

A company for production and marketing of precious-metal catalysts for transformation of hydrocarbons and manufacture and sales of other chemical products has been set up with an initial capital of DM.1,000,000 (£83,500 approx.) in Hanover, under the name of Kali-Chemie-Engelhard-Katalysatoren GmbH. The company is a joint subsidiary of the Kali-Chemie AG concern, of Hanover, a chemical and catalyst producer, and the two precious-metals manufacturers Engelhard Industries Inc., of Newark, New Jersey, U.S.A., and W. C. Heraeus GmbH, of Hanau, West Germany. At the disposal of the new company is the Kali-Chemie platinum catalyst plant at Nienburg-on-Weser.

Erection of German Oil Plant

Oil processing plant consisting of liquid-gas production unit, two distillation units, a 'platformer' unit and various grade refining plant has now been erected at the new refinery of B.P. Benzin und Petroleum AG of Hamburg. Work on laboratories, cooling towers and other installations of this West German subsidiary of the British Petroleum Group is reported to be well advanced. On the Rhine-side plant, which is sited at Dinslaken, near Cologne, work was started a year ago this month.

Diamond Alkali Produce First Nonconjugated Polyacetylenes

SYNTHESIS of nonconjugated polyacetylenes (polyynes) were reported by Diamond Alkali to the 136th A.C.S. National meeting. The process developed is stated to give large carbocyclic compounds containing nonconjugated triple bonds in good yields and to represent a simple, economical method to produce acetylenic hydrocarbons of definite chain lengths. Interest in these compounds centres on their commercial potential as high-energy binders and plasticisers for solid rocket propellants, as well as intermediates for solid boron rocket fuels.

Dr. John H. Wotiz and co-workers used α, ω-dihalides to alkylate a mixture of mono- and disodium acetylides and give linear and cyclic polyynes. Monosodium acetylide acts as a chain stopper in the reaction to keep the formation of high molecular weight polyynes under control. Excess of sodium acetylides assumes hydrogen-terminated polyynes.

The new polyacetylenes have nonconjugated triple bonds and unusual thermal stability, it is reported. The lower weight products are colourless liquids and those with several triple bonds are solids. Largest cyclic polyyne is 1, 7, 13, 19—cyclotetracosatetrayne.

Use of the polyynes as intermediates is based on the regularly spaced triple bonds. The potential added energy of these bonds also suggests use of the new polyynes as binders and plasticisers in the solid propellant field. Diamond Alkali's process is judged to be good from the standpoint of raw material costs.

PEOPLE in the news

● **Mr. J. W. Meredith,** managing director of Huntington, Heberlein and Co. Ltd., has been appointed a director of Simon-Carves Ltd., of which company the former-named is a subsidiary.

● **Mr. F. Burgess,** Whites-Nunan Ltd., has been elected chairman of the British Valve Manufacturers' Association for 1959/60, and **Mr. J. W. Plowman** (Dewrance and Co. Ltd.) has been elected vice-chairman. The new members of the executive committee are: **Mr. D. S. Birkett,** Samuel Birkett Ltd., and **Mr. A. L. Trump,** Saunders Valve Co. Ltd.

● **Mr. L. A. Johnson,** director and sales manager of Detel Products Ltd., left the U.K. towards the middle of November on a business tour of the Middle East, stopping off in Rome for consultation with associates interested in coatings for atomic projects. He will also visit refineries, government departments and service establishments in Aden, Khartoum, Bahrain, Beirut and Kuwait, returning to London on 9 December.

● **Dr. W. J. Bushell** has been co-opted to the board of Cellon, and has been appointed deputy chairman. He is director and general manager of the chemical division of Courtaulds, the parent company. **Mr. A. Wallace Barr** has been appointed managing director of Cellon as from 1 January.

● **Sir Walter Worboys,** commercial director on the main board of the I.C.I., retired at the end of October after 34 years' service with the company. He is succeeded in the post by **Mr. W. D. Scott,** who at the time of his new appointment was a Billingham Division director. Sir

Sir Walter Worboys

Walter joined Synthetic Ammonia and Nitrates at Billingham in 1925, and became delegate director in 1933. For a year from 1941 he was acting joint manager and then joined the board of what is now the Plastics Division. He moved to the main board in 1948 and was knighted last year.

● **Mr. E. Roy Mullins,** of Parmalee (G.B.) Ltd., and **Capt. Overton** of James North and Sons Ltd., have been respectively elected chairman and vice-chairman of the council of the newly formed Industrial Safety (Personal Equipment) Manufacturers' Association. Treasurer is **Mr. G. G. T. Wright,** Mine Safety Appliances Co. Ltd., and the other elected council members are: **Mr. J. W. Broughton,** Betts and Broughton Ltd.; **Mr. J. Davis,** Lewis Gilder and Co. Ltd.; **Mr. T. A. S. Green,** Chance Bros. Ltd.; **Mr. E. S. Knott,** Wm. Stephens and Sons Ltd.; **Mr. D. A. Lipyeat,** G.Q. Parachute Co. Ltd.; **Mr. B. J. McQuire,** Barrow, Hepburn and Gale Ltd.; **Mr. T. J. Noblett,** Helmets Ltd.; **Mr. J. C. S. Titchmarsh,** British Celanese and Courtaulds Ltd.; and **Mr. L. Soffa** of Jeltek Ltd.

● **Mr. H. White, A.M.C.T., F.R.I.C.,** divisional director of research and development, James North and Sons Ltd., Hyde, Ches, has been elected a fellow of the Plastics Institute.

● **Dr. D. B. Foster, Ph.D., M.I.Mech.E., M.I.E.E., M.I.Chem.E., M.Inst.F.,** has been appointed consultant to the board of the newly formed Gresham Automation Ltd., Gresham House, Twickenham Road, Hanworth, Middlesex, specialists in automation in batch process production.

● **Mr. F. C. Braby,** chairman and managing director of Fredk. Braby and Co. Ltd., has been elected chairman of the council of the British Non-Ferrous Metals Research Association to succeed **Dr. Maurice Cook, C.B.E.,** who retires from office on 31 December next.

● **Dr. H. R. Ambler, O.B.E., F.R.I.C.,** has been appointed to the newly created post of scientific adviser to the U.K. High Commissioner in New Delhi, and will take up his duties at the end of the year. In addition to advising the High Commissioner on scientific matters, he will be responsible for furthering the exchange of information between British and Indian scientists. Dr. Ambler, who is 58, will hold the rank of senior principal scientific officer in the Department of Scientific and Industrial Research. He joined the Government service shortly after he graduated with first class honours in Chemistry at London University in 1920. Since then he has held a variety of posts at home and abroad and has spent seven years in India. At present, he is assistant director of the Ministry of Aviation's Chemical Inspectorate at Woolwich (formerly under the Ministry of Supply).

● **Professor R. B. Woodward,** of the Department of Chemistry, Harvard University, has been awarded the Davy Medal of the Royal Society in recognition of his distinguished researches in organic chemistry, particularly for his contributions to the structure and synthesis of natural products.

● **Sir Alexander Fleck, K.B.E., F.R.S.,** chairman of Imperial Chemical Industries Ltd., was made a companion of the Textile Institute at the recent annual convocation staged in Manchester, when several awards and diplomas were presented.

● **Miss Violet Brewer,** daughter of Mr. George T. Brewer, Jr., Liberian Ambassador to the U.K., last week began a course of training in the laboratories and workshops of Evans Medical Ltd., Speke, Liverpool. Under the 1957 agreement with the Government of Liberia, the company was appointed sole suppliers or purchasing agents of all pharmaceutical products and medical equipment required by Liberia. The company also agreed to train three Liberians in the practical aspects of pharmacy and chemistry to enable them to take up positions in the Government medical stores at a future date.

● **Mr. Allen L. Stock,** who was recently appointed chairman of Morgan Crucible Co., is relinquishing his position as chairman of Lodge Plugs as he is unable to continue to carry out the full duties of that office.

● **Mr. Hector D. Walker,** sales director of Constructors John Brown Ltd., left London on Friday, 6 November, for Melbourne, Australia. He will be away for approximately two weeks.

S.I.M.A. Team Leaves for Moscow

Members of the S.I.M.A. team at London Airport on 9 November before leaving for Moscow, l. to r., H. D. Binyon (Solartron Electronic Group Ltd.), L. A. Woodhead, S.I.M.A. president (Cossor Instruments), C. F. Hamill (Hilger and Watts) and K. A. MacDonald (Unicam). They will discuss the holding of an exhibition of British instruments in Moscow in 1960

Chemist's Bookshelf

SILICONES UP TO DATE

SILICONES. By *Robert N. Meals* and *Frederick M. Lewis*. Published by Reinhold Publishing Corp. Pp. 257. 48s.

This little book is a very worthy addition to the well-known Reinhold Plastics Applications Series and should appeal to all but the specialist reader. Although the theme of this series is stated to be "guidance in application", Authors Meals and Lewis have managed to present a great deal of useful information about the basic chemistry and physics of the silicones. Chapter 2, which deals with general properties, is especially interesting and a serious attempt has been made here to interpret in simple structural terms some of the special physical properties of the silicone fluids, such as their curious viscosity/temperature relationship.

Although only the latter half of this book is devoted to the applications of the silicones, all the principal fields including such diverse uses as mould release, cosmetics, plastics, antifoaming, food manufacture, water repellancy and so on have been treated more than adequately. The authors have not been content merely to describe these many and varied applications of the silicones, but have offered in most cases some theoretical explanation for their selection. It is interesting to note that all this has been achieved almost entirely without the use in the text of trade names of commercially available silicone materials, an omission which may be deplored by some but will be applauded by many.

The book and especially the section dealing with applications is well provided with understandable diagrams and appropriate photographs. As might be expected in these times, the chapter on future prospects of the silicones has something of importance to say about the great thermal and oxidative resistance of these versatile materials. The book also provides a useful bibliography of general but not of patent literature, as well as an appendix offering a valuable summary of the systematic nomenclature used in the organo-silicon group. The index is fully adequate and, in addition to expected items, refers to such intriguing subjects as "mach" number, "alkyd-silicones" and "eye-glass tissues".

The authors are to be congratulated in combining brevity, coherence and lucidity in a subject of such wide scope, but even more so for the critical and interpretative nature of their review.

G. SWANN.

Comprehensive Work on Classical Analysis

COMPREHENSIVE ANALYTICAL CHEMISTRY VOL. IA.—CLASSICAL ANALYSIS. Edited by *C. L. Wilson* and *D. W. Wilson*. D. van Nostraud Co. Ltd., London, 1959. 105s.

'Comprehensive Analytical Chemistry' which will eventually comprise five volumes, some consisting of several parts, is an ambitious work, which is intended to cover the whole field of analytical chemistry. Its purpose is to present in one place a full review of all established methods, each part to be written as far as possible by experts in thet particular field so that not only will the account be authoritative, but also critical in that older methods will be appraised in the light of new knowledge.

Volume IA is certainly a very good beginning to the project and augers well for the others which are to follow. It is concerned with the classical methods of analysis. Chapter I, by the editor, is an introduction which covers the philosophy of analytical chemistry and of the analytical chemist. Chapter II deals with the methods which are used in the fabrication of the analysts implements. This treatment is unusual and highly informative. It is followed by an excellent account of sampling and the application of statistical methods of mathematical analysis to the study of results obtained by chemical analysis—a tool which is too infrequently used and frequently misused.

Construction and use of the basic analytical tool, the analytical balance, is then reviewed and this is followed by an equally important and well written account of the measurement of volume in relation to titrimetric analysis. The text then gets down to basic chemistry in an account of separation methods based on solvent extraction for aqueous solution. The treatment here is outstandingly full and noteworthy—organic reagents for inorganic analysis are presented from a slightly unusual and well considered viewpoint. The chapter on gas analysis is a full work in itself and so also are the next sections on inorganic and organic qualitative analysis. The remainder of the book (over 100 pages) is concerned with the techniques, reagents, and apparatus of gravimetric analysis with a chapter on the newer more 'ideal' methods of the so-called 'homogeneous solution' precipitation technique.

The impression that this book conveys is most praiseworthy. Here is no encyclopaedic compilation of disjointed, poorly conceived and ill-compiled scientific data, but a work that is concise, well written and truly authoritative from first to last word. It is a book which does not waste words and one which grips the attention at whatever page it is opened. It is indeed hard to visualise that the text has been written by as many as 19 authors living in four different countries, and one is led to conclude that the unity of presentation and purpose has been governed by the high measure of scientific knowledge and skill which characterises all the authors. Much credit deservedly redounds to the brothers Wilson who have performed their first Herculean labour with what I can only call a truly amazing measure of success. This is very definitely a book which will loom large on the horizons of analytical chemistry for decades to come. It is a pleasure to recommend it.

T. S. WEST.

U.K. Fermentation Processes

BRITISH FERMENTATION INDUSTRIES. By *J. M. Whitmarsh*. Sir Isaac Pitman and Sons, Ltd., London. 1958. Pp. xiv + 133. 25s. net.

This work of modest dimensions must be assessed with regard to the strict limitations imposed by the author. With the exceptions of brewing and the production of antibiotics it is concerned solely with those relatively few fermentation processes which are represented in Great Britain although to widely differing degrees. It discusses, for example, the production of industrial alcohol, vinegar, lactic and citric acids, acetone, butanol and yeast as well as vitamin B_{12}, riboflavin and dextran, together with certain miscellaneous topics such as yeast genetics, fermentative transformations of steroids and sterilisation of equipment. Clearly a thorough coverage is not to be expected, and indeed the book must appeal more to those seeking a brief factual survey.

Accepting the above limitations, the volume might perhaps have been more useful if it were always clear how far the discussion was concerned with realities and how far with interesting possibilities. For instance the reader is left uncertain whether extraction of vitamin B_{12} from sewage sludge is practised here at all and which of the steroidal transformations form industrial processes. In this connection it is curious that the chapter on acetone and butanol ends with the information that the fermentative procedure has been abandoned in the U.K.

From what has been said, a critical account of the subject is scarcely to be expected, and indeed the author sets out to be provocative rather than restrained. Not infrequently the impersonal approach normally adopted in scientific works is abandoned, while in other cases a superficial opinion is given. For instance, it is suggested (p. 23) that adaptations of yeasts to copper may explain the successful use of copper vessels in breweries, although in fact the use of such vessels does not normally lead to the uptake of unusual quantities of the metal. On the other hand, certain aspects such as the discussion of the structural chemistry of the steroidal changes are given in considerable detail such as is not conveniently found in many other reviews. Those therefore who are willing to make allowances for the relatively small compass of this book, which has to cover a wide diversity of topics, will find a readable text offering much for speculation both on the scientific and technical levels.

A. H. COOK.

Valuable Review of Advances in Chemistry by C.S.

CHEMICAL SOCIETY SYMPOSIA, BRISTOL, 1958. Special Publication No. 12. Published by the Chemical Society, London. 1959. £2 2s.

Papers on developments in aromatic chemistry are concerned in the first section of the Symposia. Modes of biosynthesis from C_1 and C_2 units are considered in an authoritative review by A. J. Birch and H. Smith. Current theories of biogenesis are summarised and methods of analysis used in this rapidly developing field are discussed in this and the next paper devoted to the genesis of naturally occurring aromatic systems from $C_3 + C_4$ fragments by G. Ehrensvard. The allied theme of metabolism of aromatic compounds is the subject of the excellent review by C. E. Dalgliesh. The remaining contributions are concerned with theoretical treatments of the following problems, by acknowledged experts in the relevant fields: diphenylene and cyclobutadiene (W. Baker and J. F. W. McOmie), azulene (D. H. Reid), conjugation in ring systems (C. A. Coulson), benzyne intermediates in nucleophilic aromatic substitution (J. D. Roberts). As with the papers on biogenesis the mention of the contributors suffices to indicate the standard of this section and in fact the symposia as a whole.

In the portion devoted to physical chemistry papers are concerned with electronic and nuclear spin resonance, and with pure nuclear quadrupole resonance. Here a majority of the contributions are in the nature of review articles aimed at a wider audience than practising spectroscopists. H. C. Longuet-Higgins discusses the physical nature of nuclear and electron resonance language which will commend itself to the non-specialist. Chemical applications of nuclear resonance, mainly of protons, in the liquid and solid states are described by R. E. Richards and E. R. Andrew; while M. J. S. Dewar performs the same service, with customary vigour, for nuclear quadrupole spectra. An article by J. A. Pople summarises the present status of the theory of chemical shifts and indirect spin coupling in proton resonance—a timely contribution in view of the increasingly wide use to which these effects are put in general chemistry.

The research papers are distributed between the three main fields. The spin resonance of the radical negative-ions formed when sodium reacts with aromatic compounds is described by D. W. Ovenhall and D. H. Whiffen. Identification of the structure of trapped radicals produced by photolysis, by pyrolysis and as transient intermediates in chemical reactions is considered by D. J. E. Ingram; this is a technique offering many advantages as compared with, say, the older-established methods of ultraviolet spectroscopy. J. A. Smith discussed the structure of polythene and polythene as disclosed by its proton resonance, and the nature of the transitions that occur in lowering the temperature. Finally, in an interesting paper J. A. Duchesne shows that bonds of the same type, for instance C-Cl, may differ in covalent character when they are present in symmetrically non-equivalent locations in a molecule.

Recent work on the inorganic chemistry of sulphur is contained in the last section and forms a most timely and modern review of the topic. Papers are devoted to the molecular forms of sulphur (G. Gee), polymorphic transformations of α-β and γ-sulphur. A summary of 20 years' work (by N. H. Hartshorne), metal sulphide structure (H. Hahn), inhibition of polymerisation of sulphur trioxide (C. F. P. Bevington and J. L. Pegler) sulphur trioxide addition products (M. Becke-Goehring), long chain sulphur compounds (F. Feher), sulphur-fluorine compounds (R. N. Haszeldine), sulphur dioxide from calcium sulphate (D. J. Dijksman). Two papers of theoretical interest on orbital size and bond type in sulphur compounds (D. P. Craig) and on interrelations of the sulphur oxyacids (F. H. Pollard and D. J. Jones) and an account of microbial transformations of inorganic sulphur compounds (J. Postgate) conclude the volume.

It is a very real pleasure to recommend this publication not only to specialists engaged in the various fields covered by the symposia but also to chemists who require a review of recent advances in the topics discussed.

R. A. RAPHAEL.

Chemist's Bookshelf

FLASCHKA'S WORK ON EDTA

EDTA TITRATIONS: An Introduction to the Theory and Practice. By *H. Flaschka*.

Brief reference to the extensive literature concerned with titrations using ethylenediamine tetraacetic acid (EDTA) would seem to indicate that here the chemist has a reagent suitable, with but slight procedural modification, for determination of the majority of inorganic ions. Full of hope he has applied the new titrant to his own particular problems of chemical analysis and often, not meeting with the immediate success he had expected, his hope has turned to scepticism.

The cause of failure, according to Professor Flaschka, has usually been "neglect of certain basic facts", presumably through ill acquaintance with the necessary theory. This is not entirely to be unexpected, since use of EDTA in analysis has become of importance only in the past ten years or so and the subject has, as yet, received but little attention in teaching curricula. Available textbook treatments are of a rather advanced nature, not particularly suited to teaching of the method in educational establishments or for its basic introduction to qualified chemists.

This situation has now been remedied by Professor Flaschka who has prepared an introductory text to the theory and practice of EDTA titrations, catering for both of the above requirements. In his book, theoretical aspects of the application of EDTA to complexometric titrations — stability constants, titration curves, endpoint detection, selectivity, masking—are dealt with clearly and concisely. Preparation of standard solutions and other necessary reagents, together with some useful hints for practical work in this field, are then outlined. Finally, the different types of titration—direct, back, replacement, indirect, multicomponent, potentiometric, photometric—receive brief, but adequate, attention.

The text is filled with experiments—many suitable for lecture demonstrations—specifically designed to illustrate the various points as these are made. Furthermore, and a factor of some importance, the experiments involve the use of only readily available chemicals. An appendix containing both questions and problems will be particularly welcomed by those persons concerned with the teaching aspect of complexometric titrations.

In the reviewer's opinion, Professor Flaschka has succeeded admirably in fulfilling his dual aim. That he has succeeded is a reflection of his undoubted authority in this field of analytical chemistry and of his wide experience as a teacher on two continents.

M. WILLIAMS.

Fourth Edition of Shell's Petroleum Handbook

SINCE 1948, when the last edition (third) of the *Petroleum Handbook*, published by Shell International Petroleum Co. Ltd., was produced, the petroleum industry has undergone many changes, both in the variety of its products and in the processes used to produce them. In the Royal Dutch/Shell Group these changes have included expansion of their chemical interests and of the research carried out in various parts of the world. The portions of the handbook dealing with these subjects have therefore been enlarged.

In its new form Shell International hope that the handbook will prove of value not only to the newcomer as a fund of information on every aspect of the industry, but also as a general education to those with many years' experience in only one branch.

Subjects covered in the handbook are as follows: World petroleum industry; production; oil products—manufacture and applications; petroleum chemicals—manufacture and applications; storage, transport and distillation; and research.

Copies of the handbook are available from Shell International Petroleum Co. Ltd., 1 Kingsway, London W.C.2, at 21s.

Chemist's Bookshelf

CHEMICAL MICROSCOPY

HANDBOOK OF CHEMICAL MICROSCOPY. Vol. I, 3rd Edit. By *E. M. Chamot* and *C. W. Mason*. John Wiley and Sons Inc. 1958. Pp. xii + 502. 112s net.

At the time of his death Dr. Emile Mannin Chamot was Emeritus Professor of Chemistry at Cornell University, and a widely acknowledged expert in many scientific fields including microscopy. Dr. Clyde Walter Mason is, at the present time, Professor of Chemical Microscopy and Metallography in the School of Chemical and Metallurgical Engineering. These two men became associated originally as instructor and pupil, and then became friends. The fruitful result of this relationship was the publishing in 1930 of the first edition of a handbook on the subject of chemical microscopy which has since become not only a standard work on the subject, but a work absolutely essential to any scientist purporting to be a microscopist.

The third edition of this work has involved Dr. Mason in a vast amount of labour, unsupported by the presence of his teacher and friend. The very least compliment that the reviewer, claiming some knowledge of microscopy, can offer is to say that the previous editions *must* move over and make room for a completely revised, enlarged, and modernised work.

The latest edition follows the same fundamental pattern in that the worker is introduced to the fundamentals of the microscope and its ancillary equipment, which has been revised and enlarged to include a vast amount of new material on resolution, numerical aperture, and the intricacies of illumination in its many forms such as vertical, phase contrast and ultra-violet. This section also includes a valuable discussion on a frequently underestimated subject, the illumination of opaque objects.

Preparing Materials

Preparation of materials for study with the microscope is then considered. In the reviewer's opinion this is the one point of criticsm in that too much ground is covered very sketchily, and small but important points of technique are not emphasised, for example, the difficulty of impregnating material of a spongy or cellular nature is mentioned, but the fact that reduced air pressure will enable the impregnating agent to enter the cells or voids of such a material is not mentioned. This is, however, a minor point of criticism of a work that does not deal primarily with technique. Then follow chapters on Special Methods for the Interpretation of Physical Properties which deals with the determination of hardness, specific gravity, melting point and so forth. The volume then flows smoothly on to Ultramicroscopy, Photomicroscopy, a new and informative chapter on Electron Microscopy, and so to refractive index and the use of the polarising microscope followed by the study of optical and physical relationships of various materials.

The fundamental purpose of this work, the physical study of chemical problems, is then built upon the firm basis of the foregoing chapters discussed above. Chemical crystallography deals with preparation of crystals for study, the determination of the various properties, followed by a chapter on measurements by the microscope, particle size determination which contains a considerable amount of fresh data and finally the techniques for the analysis of mixtures gives accounts of the various techniques such as comparative counts and cell counting methods.

A vast amount of fresh material is contained in this new edition. It is a veritable mine of references to the fields of pure and applied microscopy, and has a final titbit in the form of a pull-out reprint of the Michel-Levy Scale of Birefringence. Written clearly and concisely, it is a fundamental necessity to anyone using a microscope, whether it be for the first time, or for the ten thousandth time.

S. M. CHARLETT.

Advances in Materials Technology

MODERN MATERIALS. Vol. I. Edited by *Henry H. Hausner*. Academic Press Inc., New York and Academic Books Ltd., London. 1958. Pp. xi + 402. 89s 6d.

First of a new series of volumes designed to serve as a source of information for the engineer with broad interests, for the specialist who wants information beyond his field of specialisation and for others particularly interested in materials—executives, research and development investigators, pioneers of new materials, and students, 'Modern Materials' has as its subtitle 'Advances in Development and Applications'.

This first volume of Modern Materials covers a variety of materials and recent developments in connection with them—new uses of wood as a structural material (Carl de Zeeuw); synthetic rubbers for special service conditions (F. A. Bovey); organic and inorganic fibre materials; insulation papers for high voltages (Wm. A. Del Mar); glass required to withstand strong irradiation in nuclear engineering (N. J. Kreidl and J. R. Hensler); ceramic engineering materials and their increasingly under applications (John H. Koenig and Edward J. Smoke); the semiconductors germanium and silicon (Gustav Szekely); and zirconium (G. L. Miller). All these contributions have been prepared by experts. D.L.M.

'Perceptive' Study of Soddy

PIONEER RESEARCH ON THE ATOM: RUTHERFORD AND SODDY IN A GLORIOUS CHAPTER OF SCIENCE: THE LIFE OF FREDERICK SODDY. By *Muriel Howorth*. New World Publication, London. 1958. Pp. 352 + 16 pp. illustrations.

Mrs. Howorth, Frederick Soddy's first biographer, became acquainted with her subject when he was old, lonely and bitter, when he had become the "caustic Soddy" of *Punch* and the "gnarled old English radiochemist" of some continental papers. While the author obviously appreciates fully the significance of Soddy in the history of science, and conveys this fairly successfully to the reader, her popular-style introduction to atomic chemistry stands a little too long between him and the main theme—the life of Soddy.

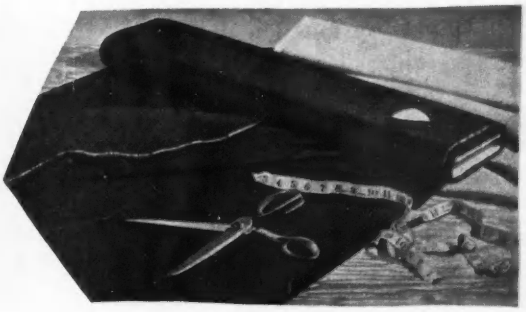
Soddy's career as a scientist began when he collaborated in original research at Eastbourne College with Hughes, his science master. From Eastbourne he went to University College, Aberystwyth, before going on to Merton College, Oxford, where he took his First in chemistry in a year in which Sir William Ramsay was external examiner. He then applied for the chair of chemistry at the University of Toronto, and set off for Canada. News reached him however, that the university had appointed a German-trained chemist. On the return journey from Toronto, Soddy left the train at Montreal to look at the new Macdonald Laboratories at McGill. This casual halt led to his two-year collaboration with Rutherford, a partnership which in two momentous years (1901-3) initiated what Soddy, with etymological exactitude termed the "*tomic* age".

In the years that followed the collaboration at McGill, up to the outbreak of the first world war, Soddy was building up his impressive body of scientific achievement—the disintegration theory, the displacement law, and the discovery of isotopes. When he left Glasgow to go to Aberdeen, to take up his first professorial appointment, the war soon put an end to the possibility of doing sustained fundamental research work. It was at that time that Soddy began to profess his ethical standpoint—that the world was not yet morally prepared to use the results of science.

As time passed recollection of Soddy's true greatness became blurred and his historic contributions to science forgotten: in the literature his name began to be omitted from its rightful place beside that of Lord Rutherford.

This book is full of repetitions and at times sadly lacks narrative march. It is not clear from Mrs. Howorth's title whether her book is concerned mainly with the history of atomic research, the partnership of Soddy and Rutherford, or, as in fact it is, with the life and opinions of Frederick Soddy. While this work is unlikely to be accepted as a definitive life of one of the greatest scientific researchers and theorists of our century, many will be grateful to Mrs. Howorth for her patiently sincere and perceptive study of a man.

D. W. F. HARDIE.



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Chemist's Bookshelf

Comprehensive Treatment of Uses of Modern Synthetic Polymers

KUNSTSTOFFE. Second Edition. By *E. Wandeberg*. Springer-Verlag, Berlin/Gottingen/Heidelberg, 1959. Pp. 431 + viii.

The first edition of this book, published three years ago, is already out of print. This fact, and recent developments in the technology of plastics and polymers, have led to the production of this revised and expanded second edition which is designed to provide a comprehensive treatment of the uses of modern synthetic polymers in a wide variety of industries. Emphasis is on applications and properties and the factors affecting the latter. Basic theory and the production of the polymers themselves are only briefly mentioned.

Polymers, such as cellulose derivatives, which are obtained from natural polymers are briefly considered in a short first section and synthetic polymers are classified. Much of the remainder of the book is devoted to detailed consideration of synthetic condensation polymers, polyadducts and addition polymers. Phenoplasts, aminoplasts, silicones, polyesters, polyamides and polycarbonates are discussed under the heading of condensation polymers. Polyadducts comprise epoxy-resins and polyurethanes. Addition polymers include polythene, polyfluorolefins, polystyrene, polyacrylic resins, polyvinyl esters and polybutadiene. The different uses and applications of these are considered at length. Thus, the uses of phenoplasts as resins, compression moulded plastics and laminates; polyesters in varnishes, adhesives, moulded plastics, textile fibres and films; and polyvinyl chloride in surface coatings, adhesives, fibres, bristles, films, tubing and sheet are all discussed in detail. Uses of polyurethanes and polystyrene as foamed plastics are included.

There are many useful tables giving such physical properties of the materials in their different applications as density, melting and softening points, dielectric constant, water absorption, tensile strength elastic modulus and loss factor. Variations of these properties under different conditions are illustrated in a number of cases by tables and diagrams. In some cases physical and chemical tests are tabulated. Uses of the different materials are well illustrated by diagrams and photographs.

A final section surveys manufacturing methods. The methods and equipment used in such processes as injection and compression moulding, extrusion, the production of sheets and laminates, welding of plastics and cocoon packing are outlined. There are some diagrams illustrating processes and many photographs of equipment and applications. These latter, in a number of cases, tend to be repetitive and may convey less to the reader than a clear diagram. There are some useful appendices. The first gives the trade names, forms and manufacturers of a large number of plastics and polymers. Another gives a selection of diagrams in the text which illustrate characteristic properties. A third is a bibliography including patents, review articles and books. Most of these are in German but there are a few in English. There is an adequate subject index.

The book appears to give an up-to-date picture of some aspects of German polymer and plastics technology. The plastics chemist and technologist will find a great deal of useful information in it. The tables of properties of different materials are likely to be of particular value.

W. R. MOORE.

History and Chemistry of Propellants

SOLID PROPELLANT AND EXOTHERMIC COMPOSITIONS. By *J. Taylor*. George Newnes Ltd., London. Pp. vii + 153. 25s.

This is a book which, in spite of its title, should prove of interest to scientists and technologists in many widely separated fields. It does not set out to give a detailed or specialised account of the subject, although its author, Dr. James Taylor, has undoubtedly been an authority of high standing for very many years.

To those not closely associated with explosives and rapid self-propagating exothermic reactions, the extent of the field and its applications may well come as a surprise. Gunpowder is, of course, a mixture known to all because of its historic part in war and politics, but how many are aware of what single substances are explosive and what relatively common compounds when blended together, form the modern propellants. Chapters are, in fact, devoted to all these and to other compositions, covering applications to blasting operations, rocket propulsion, power production and heating.

The early chapters lay down the principles of the chemical reactions involved and discuss the various decomposition processes. The stability, activation energy, initiating conditions, and combustion processes are all covered in a simplified manner, while providing a most interesting commentary on the historical development of the compounds. As an example, the combustion problems associated with rocket propellants developed during the Second World War are quoted in introducing their thermochemistry and applications to guns are discussed as a conclusion to the observations on flame structure. The latter include some useful comments on theories of burning from solid surfaces; additionally they illustrate something of the specialised jargon that has grown up in this field. Who, among the uninitiated, would understand, for example, the description of 'foam, fizz and flame' reaction, or of 'worm-holing'?

The later chapters discuss particular compositions and their applications. These include ammonium nitrite alone and combined with ammonium chloride. The latter was the basis of the 'Hydrox' blasting cartridge, whose virtue was that it was much safer than normal explosives.

While it may have been assumed that the purpose of most of these exothermic compositions must be warlike, the author has been at some pains to emphasise that this is not so and that much of the work described has peaceful applications. These range from the application of pesticides and the self-heating of tinned foods to engine starters and life-saving rockets.

Altogether the author has provided an interesting and not too elaborate account of the history and chemistry of solid compounds which act as a source of energy. His text is illustrated by a judicious selection of tables, diagrams and photographs, together with a number of references at the end of each chapter. The only criticism is that there does not seem to have been sufficient editing. It is clear that several sections have been prepared at different times and unnecessary repetition occasionally results. There is also an irritating lack of consistency in such things as units and the spelling of propellant, but this should not deter any who wish to obtain a comprehensive background to the subject.

A. D. BAXTER.

BOOKS RECIEVED

A SHORT GUIDE TO CHEMICAL LITERATURE (2nd. Edit.). By *G. M. Dyson*. Longmans Green and Co. 15s Net. Pp. 157.

ADRESSBUCH DEUTSCHER CHEMIKER. 1956/57. Verlag Chemie. 15DM. Pp. 604.

CHEMISTRY FOR FIRE ENGINEERS. By *W. Kingsley*. Hodgetts Ltd. 10s. Pp. 135.

CHYMIA. By *Henry M. Leicester*. (No. 5, Annual Studies in History of Chemistry. Oxford University Press. 40s. Pp. 214. (Printed in U.S.A.)

DICTIONARY OF NAMED EFFECTS AND LAWS (in Chemistry, Physics and Maths.). By *D. W. G. Ballentyne* and *L. E. Q. Walker*. Chapman and Hall Ltd. 30s. Pp. 205.

GLOSSARY OF TERMS USED IN VACUUM TECHNOLOGY. Issued by *Committee of American Vacuum Soc. Inc.* Pergamon Press Inc. 10s. Pp. 63.

HANDBOOK OF CHEMISTRY AND PHYSICS (40th Edit.). Chemical Rubber Publishing Co. £5. Pp. 3456.

INFORMATION AND COMMUNICATION PRACTICE IN INDUSTRY. Edited by *T. E. R. Singer*. Chapman and Hall. 70s. Pp. 304.

NEW CHEMISTRY (A SCIENTIFIC AMERICAN BOOK). G. Bell and Sons Ltd. 13s 6d. Pp. 206.

PAINT TRADE MANUAL OF RAW MATERIALS AND PLANT. Compiled by *H. W. Chatfield*. Scott Greenwood and Son Ltd. 30s. plus 1s 6d postage. Pp. 379.

PERKIN CENTENARY LONDON, 100 YEARS OF SYNTHETIC DYESTUFFS. Pergamon Press Ltd. 42s. Pp. 136.

RAW MATERIALS, A STUDY OF AMERICAN POLICY. By *Percy W. Bidwell*. Oxford University Press. 48s. Pp. 401.

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Commercial News

- **R. H. Cole Acquire E. Anglia Plastics**
- **Courtaulds Half-year Profit Nearly Double**
- **Fisons Chemical Sales Higher by £1m.**
- **Hoechst 1959 Sales May be £12 m. Up**

R. H. Cole and Co. Ltd.

R. H. Cole and Co. Ltd. have agreed to purchase 50% of the share capital of East Anglia Plastics Ltd. The management of East Anglia Plastics and their associated companies remains the same and their activities will continue as in the past.

Courtaulds

An interim dividend has been raised by Courtaulds Ltd., from 3% to 5% at the rate of 1s per £1 unit of ordinary stock, less tax at the rate of 7s 9d in the pound for year ending 31 March 1960. Group profit after taxation was £5,118,000 (£2,970,000), and in the first half of this year the company's own profits have increased, as have those of British Celanese and the subsidiaries in North America. Indications are that profits for the second half of this year will be similar to those for the first half.

Courtaulds Ltd. have made a £550,000 bid for National Plastics, the offer being made through Group Developments, a subsidiary formed by Courtaulds to handle their diversification plans.

Evans Medical Ltd.

Evans Medical Ltd have declared an interim dividend for the year ending 31 December of 2½d per 5s ordinary share. Subject to any unforseen circumstances it is expected the final will be at rate of 3½d.

Gas Purification

Group net surplus of the Gas Purification and Chemical Co., applicable to the parent company for the year ended 30 June, 1959, is £286,744 (deficit £220,986). Fixed assets including goodwill are valued at £817,528 (£830,943) and net current assets at £1,040,310 (£508,994).

Bakelite Ltd.

Interim dividend of Bakelite Ltd. is being raised from 5% to 6% on account of 1959. The 1958 total was 15%.

Sales have continued to increase and have been approximately 20% higher in the first nine months of 1959.

Fisons Ltd.

Group sales of Fisons Ltd. were £46,688,000 for 1958/59, against £47,391,000 for the previous year. Fertiliser sales in the U.K. were lower partly because of price reductions. Chemical sales, however, were more than £1 million higher. Group profit before tax was £3,641,360 compared with £3,142,478. Charge for taxation in the present account is £1,836,391. Net profit is £1,801,000 against £1,595,000 last year.

Cash resources are described by chairman, Sir Clavering Fison, as satisfactory. Cash and short-dated Government securities at 30 June 1959 amounted to £6,758,000 compared with £5,819,000 last year. Outstanding capital authorisations at 30 June amounted to £1,088,000 and since the end of the financial year the board has authorised further capital expenditure, the main item of which is £1 million to be spent at Fisons' fertiliser factory at Immingham.

Dividend has been increased from the equivalent of 10% to 12% and a one-for-three scrip issue is proposed.

Simon-Carves

Simon-Carves Ltd. have declared an interim of 10%, less tax, for the year ending 31 December.

Yorkshire Tar Corp.

Final dividend for the year to 30 June 1959 of Yorkshire Tar Corporation on privately held 'A' and 'B' ordinary shares is 6½% on increased capital. An interim of 12½% was paid on ordinary shares prior to the capital increase. During the year 'A' shareholders received a distribution of 5s per share out of capital surplus and 'B' shareholders a dividend of 5s tax free. Also ordinary shareholders have receivd a 200% scrip issue, 100% of which was in 6½% redeemable preference shares, and 100% in ordinary shares, subsequently divided into 'A' and 'B' shares.

Net profit is £81,767 (£67,080) after tax of £162,603 (£244,559).

Manchester Oil

Ordinary dividend of Manchester Oil Refinery (Holdings) is being resumed with a 5% interim for 1959—the last payment was the 8½% final making 12½% for 1957.

Farbwerke Hoechst AG

Turnover of the Frankfurt-on-Main chemical producer Farbwerke Hoechst AG for the current year is likely to be well over DM.2,000 million (some £170 million) as against a turnover for 1958 of DM.1,890 million (£157.5 million). Turnover of Hoechst's foreign subsidiaries, excluded in these totals, is expected to rise to between DM.60 million and DM.70 million (between £5 million and £5.835 million). In the first nine months of this year the company's turnover rose by 15%, signifying that a continuation of this level would bring annual turnover to something like DM.2,150 million. The increase in turnover is double that of 1958 over 1957. Home sales are responsible for an increase rather below the overall figure of 15% but the raising of foreign sales by 20% put the general increase at such a level.

Total value of Hoechst exports in 1959 is estimated at well above DM.700 million (£58.350 million), or 32% of total turnover. The high turnover is made in the face of price cuts which represented about 2½% of all turnover.

Petrochemical production is being further developed by erection on the Hoechst site of a new plant for the production of acetaldehyde from an ethylene starting material. 1960 investments by the company, which hints that it will raise its capital again at some time in the future, are for an estimated DM.300 million (£25 million) at home and some DM.35 million (almost £3 million) abroad. This compares with figures for the current year of DM.245 million (£20.420 million) and DM.30 million (£2.5 million), respectively. 1959 dividend is expected not to fall below last year's level of 14%.

Commercial Solvents Corp.

Third quarter sales of Commercial Solvents Corporation amounted to $19,348,071 ($18.276,682); net earnings $917,749 ($321,605) equal to 33 cents (11 cents) a share, and for nine months sales $51,822,428 ($46,688,819), net earnings $2,285,061 ($1,057,530) or 83 cents (38 cents).

Allied Chemicals

Third-quarter earnings of Allied Chemical Corporation were equal to $1.18 a share, 46% above the 1958 quarter. Nine months' net earnings are equal to $3.99 a share, up 70% from the first three quarters of 1958. The company report that they expect earnings for 1959 to exceed $5 a share with record sales above $700 million.

APPOINTMENT OF RECEIVER

D. AND C. AND WILLIAM PRESS LTD., erectors of oil refineries and chemical plants, etc., 6 Raymond Buildings, Grays Inn, London W.C.1, Ean C. Baillie, 23 Blomfield Street, London E.C.2, was appointed receiver and manager on 13 October.

INCREASE OF CAPITAL

ALCHEMY LTD., Brettenham House, Lancaster Place, Strand, London W.C.2. Increased by £250,000, in 125,000 'A' and 125,000 'B' shares of £1 each, beyond the company's registered capital of £100,000.

NEW COMPANY

SAGINEX LTD. Cap. £100. To acquire patents, patent rights, brevets d'invention and licences relating to pharmaceuticals, drugs, medicinals, fine chemicals, etc. The subscribers (each with one 'A' ordinary share) are: A. J. Garner, solicitor, and R. M. Thomas, solicitor, both of Imperial Chemical House, Millbank, S.W.1. The number of directors shall be five, of which three-fifths shall be appointed by 'A' shareholders and two-fifths by 'B' shareholders. Alfred C. King and Harold Foulds are first 'B' directors. Solicitors: J. W. Ridsdale, Imperial Chemical House, Millbank, S.W.1.

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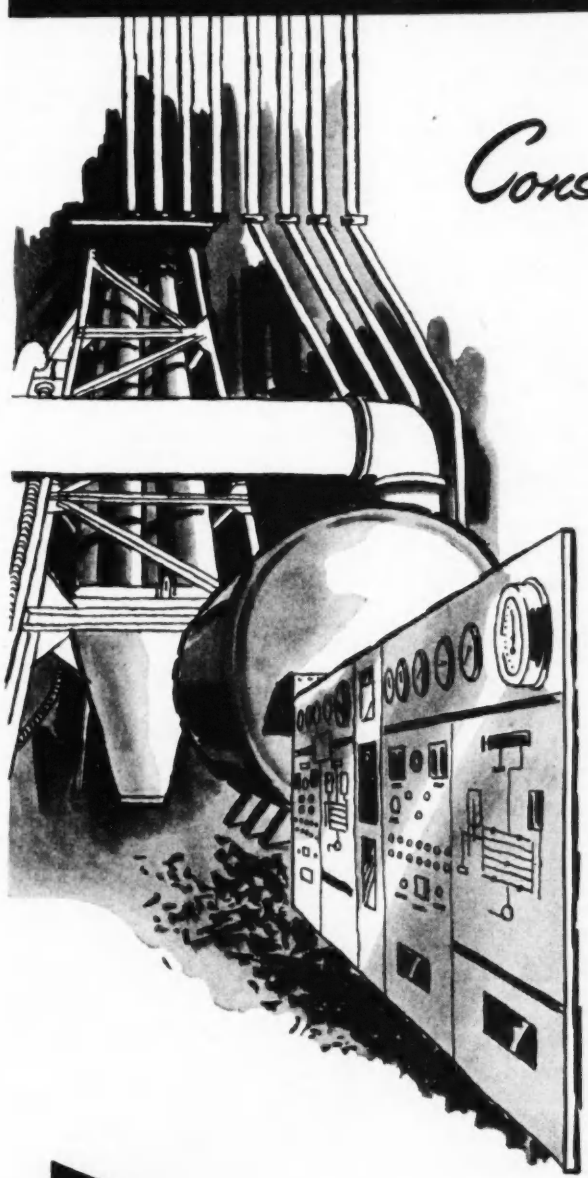

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TRADE NOTES

Fatty Acids and Alcohols

Functions of fatty acids and fatty alcohols in manufacture of soaps, toiletries and cosmetic products are described in a new technical publication issued by Price's (Bromborough) Ltd. Wide uses of these raw materials are illustrated, together with formulations and analytical methods. Address of the firm is Bromborough Pool, New Ferry, near Birkenhead.

New KnitMesh Products

KnitMesh demisters, mist eliminators and separators are described in a new catalogue produced by KnitMesh Ltd., 36 Victoria Street, London S.W.1. These include large sectional demisters made in special shaped pads to customer needs. Removal efficiency is said to be 99-100% at usual operating conditions; pressure drop is normally less than 1 in. water gauge. Spiral wound units are also available. The company offers random packings in all materials. Full installation notes are included.

P.V.C. Waterproof Clothing

Latest in the range of p.v.c. waterproof clothing by Jeltek Ltd., Green Lane, Hounslow, Middlesex, are long coats, trousers and jackets, etc., for which above-average strength for this type of garment is claimed. The range is manufactured from close-weave cotton duck impregnated on the face side with a highly flexible p.v.c. coating, said to resist tendency to crease when stored.

Rotary Drying

Head, Wrightson and Co. Ltd., 20 Buckingham Gate, London S.W.1, who have issued 'Rotary Dryers,' a new booklet, now manufacture seven types of rotary dryer, utilising the principles of direct, indirect or a combination of indirect-direct heating. The booklet deals with material to be dried, dryer construction, and gives information on the various types of dryers, rotary kilns and rotary coolers that are available.

Antioxidants in Food

New entries in the B.D.H. catalogue, published by the British Drug Houses Ltd., B.D.H. Laboratory Chemicals Division, Poole, include butylated hydroxy-anisole (a mixture of 2-*tert.*-butyl-4-methoxy-phenol and 3-*tert.*-butyl-4-methoxy-phenol), *n*- dodecyl gallate, and *n*-octyl gallate. These three antioxidants are approved for use in foodstuffs. Other new entries include carbon disulphide for use in infra-red spectroscopy, potassium borohydride (KBH_4), Union Carbide molecular sieves and Hyamine 2389, a wetting agent by Rohm and Haas that is recommended to preserve the fluid flow pattern through the Technicon AutoAnalzer.

Colloidal Dispersions

Two new publications issued by Morgan Crucible Co. Ltd., Battersea Church Road, London S.W.11, are entitled 'Colloidal Dispersions' and 'Foliac Colloidal Graphite.' They both deal with applications.

High Gloss Coatings on Paper

A new butadiene copolymer latex, known as BC.1, that is being developed by I.C.I. Plastics Division, is of particular interest to converters producing high-gloss coatings over printed paper and board. With the new latex, the printed paper or board is coated with latex and then glazed by pressing between polished platens at 120°C and ½-¾ tons/sq. in. pressure.

Gresham Automation

The interest in the Gresham unit sequencing system, has been so great that a separate company, with the name of Gresham Automation Ltd., at Gresham House, Twickenham Road, Hanworth, Middx, has been formed. It will advise on complete automation schemes and the supply of Gresham unit sequencing systems, with ancillary instruments and controls. The Gresham system meets the need for an economic form of automation in batch process production, particularly in the chemical and food processing industries.

The company is already concerned with the automation of several chemical plants to be installed in Russia.

Change of Name

Celanese Plastics Textiles and Chemicals Ltd., 22-3 Hanover Square, London W.1, have changed their name to British Lego Ltd.

Market Reports

ACTIVE TRADING IN INDUSTRIAL CHEMICALS

LONDON Active trading conditions, both for home and export, have been reported from most sections of the industrial chemicals market, and apart from the price fluctuations in the non-ferrous metal compounds, prices are firm generally.

As from 6 October, the bases price for white lead advanced by £2 10s per ton and for red lead and litharge by £2 15s per ton. Zinc oxide prices have reacted with the red seal now being quoted at £107 10s per ton.

The call for fertilisers has been maintained at a good level and prices are firm. Fair buying interest has been shown in coal tar products, with little change in the position of cresylic acid and creosote oil.

MANCHESTER From the point of view of fresh inquiry and actual movement into consumption, conditions on the Manchester market for heavy chemicals has been satisfactory, most industrial consumers, including some sections of the textile industry, absorbing regular supplies of the leading soda and potash compounds, and a wide range of miscellaneous chemicals. There has been little change in prices, the undertone being firm. In the fertiliser section, there is a steady demand for basic slag, with fair activity reported in the compounds.

SCOTLAND Trend of business during the past week has again been maintained at a steady level. Buying generally has been brisk and quantity demands in regard to spot and contract requirements have both been well up to normal. Enquiries have again featured well and these have been quite varied. Prices in most sections have continued firm, with some slight variations. Considerable interest is still being shown in the export market, which remains at a satisfactory level.

DIARY DATES

MONDAY 16 NOVEMBER

R.S.A.—London: John Adam St., Adelphi, W.C.2, 6 p.m. Cantor lecture, 'Technological education', by Dr. P. F. R. Venables.

S.C.I.—London: 14 Belgrave Sq., W.1, 10 a.m. Symposium on 'Pyrethrum'.

WEDNESDAY 18 NOVEMBER

I.Chem.E.—Leeds: Houldsworth School of Applied Science, University, 7.30 p.m. 'Chemical engineering methods in biochemical processes'.

R.I.C.—London: Shell-Mex House, Strand, W.C.2. Annual meeting, followed by film show.

R.S.A.—London: John Adam St., Adelphi, W.C.2, 2.30 p.m. 'Recent advances in food preservation', by W. B. Adam.

THURSDAY 19 NOVEMBER

R.S.—London: Burlington Hse., W.1, 4.30 p.m. Special general meeting.

FRIDAY 20 NOVEMBER

Royal Inst.—London: 21 Albemarle St., W.1, 9 p.m. 'Atoms and molecules', by Prof. Sir Lawrence Bragg.

Soc. of Dyers & Colourists—Manchester: Textile Inst., 10 Blackfriars St., 7 p.m. 'Dyeing and printing polyester and polyester/cellulose mixtures with Polyestren dyes', by H. Musshoff.

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NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sales Branch), 25 Southampton Buildings, Chancery Lane, London W.C.2, price 3s 6d including postage; annual subscription £8 2s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period

AMENDED SPECIFICATIONS

On Sale 23 December

Treatment of films of polyethylene resins. Celanese Corp. of America. **787 403**

ACCEPTANCES

Open to public inspection 31 December

Treatment of flue and stack gases. Chemical Construction (G.B.) Ltd. **826 221**

Separation of isotopes. U.K. Atomic Energy Authority. **826 128**

Purification of combustible gases. Holmes & Co. Ltd., W. C., Cullingworth, J. E., and Cooper C. [Cognate application 6 941.] **826 225**

Herbicidal compositions and substances for use therein. Monsanto Chemical Co. [Addition to 769 222.] **826 130**

Zone melting and refining of refractory materials. National Research Development Corp. **826 132**

Method of and means for rendering available for use remote deposits of natural gas. Muck O. H. **826 135**

Phosphate fertilisers. Iowa State College Research Foundation. **826 234**

Producing high density titanate ceramic bodies. Clevite Corporation. **826 143**

Process for removing oil from oil-in-water emulsions. Farbenfabrik Wolfen Veb. **826 144**

Separation of mixtures of benzene carboxylic acids. Mid-Century Corp. **826 236**

Derivatives of cyclodiene carboxylic acids. Esso Research & Engineering Co. **826 146**

Purifying terephthalic acid which contains para-toluic acid. Farbwerke Hoechst AG. **826 239**

Wet-treating arseniuretted or sulfarsenidic materials, particularly ores, containing cobalt and/or nickel, together with iron in variable proportion. **826 242**

Producing ε-aminocaproic acid from waste products of ε-caprolactam products. Leuna Werke W. Ulbricht Veb. **826 243**

Preparation of kojic acid by fermentation. Pfizer & Co. Inc., C. **826 244**

Coatings of high melting point materials produced by the detonation process. Union Carbide Corp. [Addition to 742 387.] **826 246**

Synthetic polyesters and products formed therefrom. Du Pont de Nemours & Co., E. I. **826 248**

Polymerisation of olefins. Ruhrchemie AG. **826 252**

Molasses treatment. International Minerals & Chemical Corp. **826 164**

Separation of *sec*-butyl ether from butylene codimers by distillation. Esso Research & Engineering Co. **826 260**

Stabilisation of polymers. Newby, H. (Chemische Werke Hüls AG.). **826 262**

Coating method for polyethylene and composite articles thereby obtained. Dow Chemical Co. **826 269**

Preparation of surface-active substances. Henkel & Cie GmbH. **826 171**

Removal of contaminating material from, and the smoothing of, metal surfaces. [Cognate application 15 614.] Laporte Chemicals Ltd. **826 172**

Recovery of polymers. Phillips Petroleum Co. **826 271**

Photopolymerisable compositions and their uses. Du Pont de Nemours & Co., E. I. **826 272**

Fluid analysis. Union Carbide Corp. **826 174**

Piperididine compounds and their production. MacFarlan & Co. Ltd., J. F. [Addition to 797 448.] **826 274**

Interpolymerisation of hydrocarbons. Du Pont de Nemours & Co., E. I. **826 178**

Polymerisation catalysts for olefins. Esso Research & Engineering Co. **826 184**

Contact apparatus and a process for continuous production of hydrocyanic acid. Deutsche Gold- und Silberscheideanstalt Vorm. Roessler. **826 185**

Electrophoretic separation of isotopic ions. Oss, Van C. J., and Beyrard-Benchemoul, N. R. **826 278**

Method of making α l-menthol. Heyden Newport Chemical Corp. **826 281**

Monomer recovery process. Phillips Petroleum Co. **826 284**

Producing porous sheet material. Owens-Corning Fiberglas Corp. **826 205**

Coating of zirconium. Associated Electrical Industries Ltd. **826 288**

2,0'-dihydroxy-monoazo dyestuffs containing pyrolidenyl residues and their metal complex compounds. Farbenfabriken Bayer AG. **826 207**

Polymerisation of olefins. Badische Anilin- & Soda-Fabrik AG. [Addition to 781 837.] **826 289**

Heat sealable polymethylene laminate. Union Carbide Corp. **826 290**

Chemical process and product and abrasive articles made therefrom. Union Carbide Corp. **826 208**

Simultaneous cooling and purification of hot gases. Btaafsche Petroleum Maatschappij NV. **826 209**

Distillation of organic compounds. Imperial Chemical Industries Ltd. **826 291**

Telomers of hydrocarbon olefins and methyl-containing cyclic compounds. Esso Research & Engineering Co. **826 292**

Process for purifying hydrocarbons. Otto Construction Corp. **826 297**

Process for air separation by liquefaction and rectification. Soc. l'Air Liquide, Soc. Anon. pour l'Etude et l'Exploitation des Procedes G. Claude. **826,278**

Production of mono-hyroxy aluminium di-acetylsalicylate. Lewis-Howe Co. **826 299**

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OFFICIAL APPOINTMENTS

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Biochemist required for work in connection with fundamental problems in bacteriological and virus research and metabolism of helminths; bone, soil and pasture analysis and analysis of local supplementary stuffs; field surveys on haematology in local bovines during various seasons of the year and under different states of health and nutrition. Candidates should possess a qualification in Biochemistry and/or have an Honours degree in Science of which one subject should have been Biochemistry, but applicants with Honours degree in Chemistry (Organic) and with qualification or experience in Physiology could be considered. Post-graduate experience an advantage. Selected candidate will work with a team already studying blood constituents of normal and abnormal cattle.

Appointment on short term contract with gratuity (taxable) on satisfactory completion of engagement of £37.10s.0d. for each completed period of three months' service (including leave). Salary £1,248 to £1,824 a year (including Inducement Pay and contract addition); salaries revision under consideration and an interim addition of 10 per cent on basic salary scale (£888—£1,380 a year) will also be paid. Entry point determined by experience.

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A Children's (Separate Domicile) Allowance also payable at rate of £75 a year for each of up to two children under eighteen, ceasing if children join parents in Nigeria.

Application forms from Director of Recruitment, Colonial Office, London, S.W.1., (quoting BCD 67/14/010).

LONDON COUNTY COUNCIL

Camberwell School of Arts and Crafts. Peckham Road, London, S.E.5, require assistant teacher of Science, for whole-time and part-time students in printing and related courses; industrial and/or teaching experience an advantage.
Burnham (F.E.) Salary scale for Grade B assistants (maximum £1,201 but with graduate and training allowances as applicable up to £1,486). Starting salary according to age, qualifications and experience.
Application forms from Secretary at College, returnable within 14 days.

OFFICIAL APPOINTMENTS: continued

INSPECTOR OF EXPLOSIVES : HOME OFFICE. Pensionable post in London for man or woman aged at least 30 on 1.1.60 with honours degree in chemistry or equivalent qualification. Experience of the working of an explosives factory or in petroleum industry an advantage. Duties involve travel to all parts of the country, and include advising on safety precautions for manufacture, storage and conveyance of explosives; inspecting premises licensed for manufacture and storage; advising on safety precautions for storage and conveyance of petroleum and other dangerous substances. London salary scale (men): £1,470—£2,080. Starting salary may be above minimum. Promotion prospects. Write Civil Service Commission, 17 North Audley Street, London, W.1. for application form quoting S5054/59. Closing date 17th December 1959.

UNIVERSITY OF CAPE TOWN

SENIOR LECTURER IN CHEMICAL ENGINEERING

Applications are invited for the above post. Candidates should possess a degree in Chemical Engineering or Applied and Industrial Chemistry and have had experience in the practice of Chemical Engineering in industry and/or in teaching and research. The successful candidate will be expected to assume duty as early as possible in 1960.

The salary is £1,760 × 60—£2,060 per annum.

Applications (with copies of testimonials) should state age, experience, qualifications and research work completed or in progress and give the names of two referees whom the University may consult. Two copies of the application should be sent to the Secretary, Association of Universities of the British Commonwealth, 36 Gordon Square, London, W.C.1. (from whom memoranda giving the general conditions of appointment, information concerning the department and duties should be obtained) not later than **31st December, 1959**. A third copy of the application should be sent by airmail to the Registrar, University of Cape Town, Private Bag, Rondebosch, C.P., South Africa by the same date.
The University reserves the right to appoint a person other than one of the applicants or to make no appointment.

To be published in December

1960 CHEMICAL AGE DIRECTORY and WHO'S WHO

Every subscriber to 'Chemical Age' will receive a free copy of this completely revised and enlarged Directory. Extra copies are available at £3.3.0 each.

BOX NUMBERS: *Reply c/o "Chemical Age" · Bouverie House · Fleet Street EC4.*

OFFICIAL APPOINTMENTS: continued

UNIVERSITY OF SYDNEY
LECTURESHIP/SENIOR LECTURESHIP IN CHEMICAL ENGINEERING

Applications are invited for the above position. Candidates should have an honours degree in Chemical Engineering, and should have had some teaching or industrial experience. For appointment at the Senior Lecturer grade preference will be given to candidates with a higher degree.

The salary for a Senior Lecturer is within the range £A2,200—80—£2,600 per annum; for a Lecturer within the range £A1,500—90—£2,100 per annum. In each case cost of living adjustment will be allowed. The salary is subject to deductions under the State Superannuation Act. The commencing salary will be fixed according to the qualifications and experience of the successful applicant.

Under the Staff Members' Housing Scheme, in cases approved by the University and its Bankers, married men may be assisted by loans to purchase a house.

Further particulars and information as to the method of application may be obtained from the Secretary, Association of Universities of the British Commonwealth, 36 Gordon Square, London, W.C.1.

Applications close, in Australia and London, on **19th December, 1959.**

PATENT AND TRADE MARKS

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The University reserves the right to appoint a person other than one of the applicants or to make no appointment.

To be published in December

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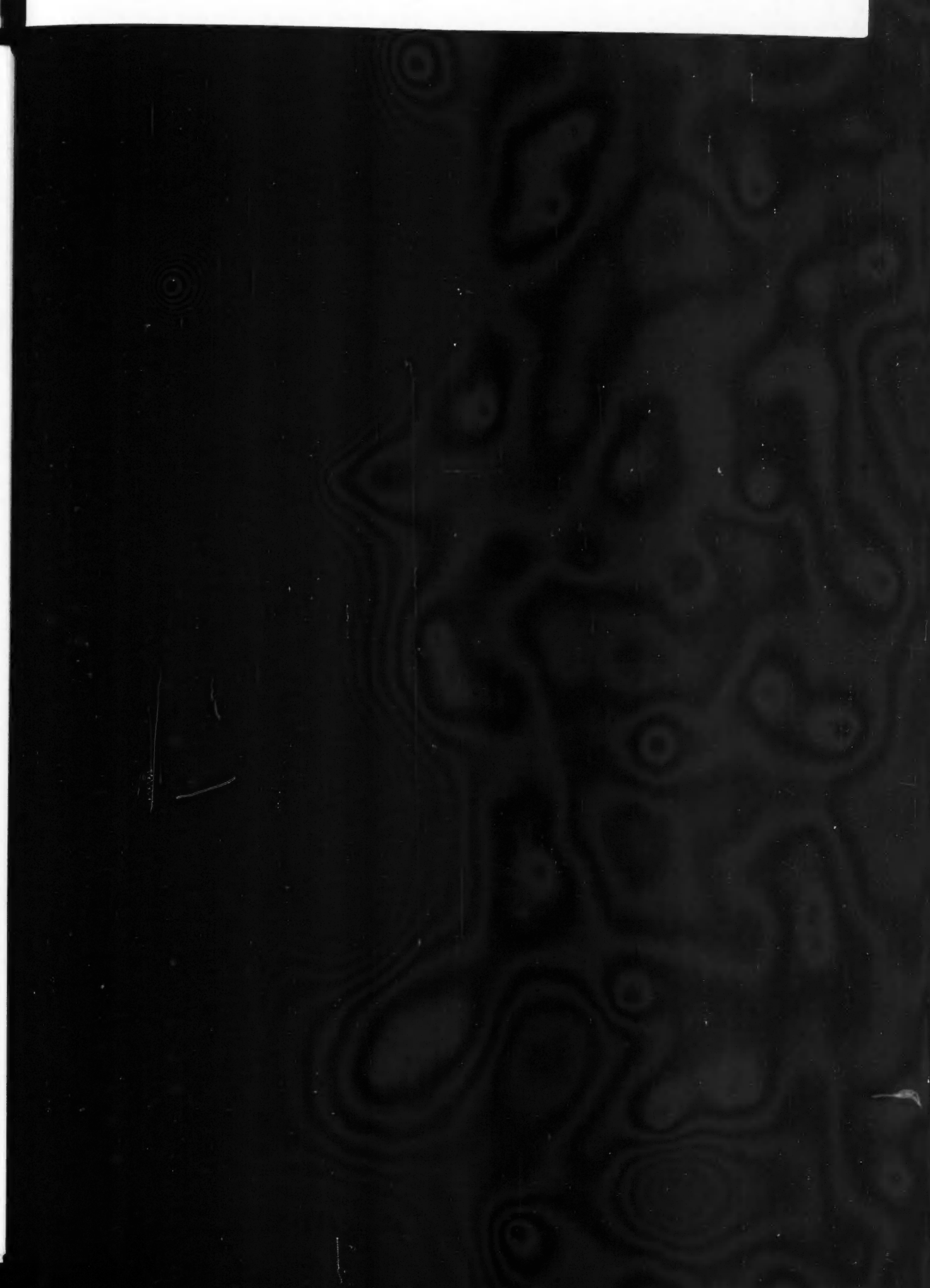
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